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ABSTRACT

Information is provided on the Vocational English as a Second Language (VESL) component of Oakton Community College's Project BEST (Building Energy Systems Technology), a bilingual vocational training program designed to teach limited English proficient students of Polish or Hispanic origin the basics of heating, refrigeration, and air conditioning in order to enable graduates to obtain entry-level jobs in the field. After part I describes Project BEST, part II provides a description of the VESL component of the program, highlighting its emphasis on spoken, job-related English. Part III offers suggestions and warns of pitfalls in incorporating technical English into instruction, while part IV provides an overview of the VESL curriculum, which focuses on the grammatical forms that students would be most likely to use on the job. Part V describes the program's VESL competency list and sheets, while part VI offers a profile of the students and details their progress. Part VII offers a curriculum and program evaluation. The final sections contain the Project BEST Vocational Competency List, part I, part II provides a the Project BEST VESL Competency List, VESL competency sheets and instructional materials, quizzes, and a bibliography. (EJV)

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Project BEST

Vocational English as a Second Language Curriculum

Communication Skills for Training and Employment in Heating, Refrigeration and Air Conditioning

Oakton Community College/MONNACEP
Des Plaines, Illinois

TC 870398

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Project BEST

Vocational English as a Second Language

Curriculum

Communication Skills for Training and Employment in Heating, Refrigeration and Air Conditioning

Submitted to the
Office of Bilingual Vocational Education, U.S.D.E.
August, 1987

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I. Program Description and Purpose of Document

Project BEST (Building Energy Systems Technology) is a bilingual vocational training program funded by a federal grant from the Office of Bilingual Vocational Education, U.S. Department of Education. The program began in March, 1986 at Oakton Community College at the Des Plaines, Illinois campus. Training is tuition-free, and is offered through MONNACEP, Oakton College's adult continuing education program. In Project BEST, limited English proficient (LEP) students learn the basics of heating, refrigeration and air conditioning. The ultimate goal of training is to enable graduates to obtain entry level jobs in this vocational field. In addition to practical hands-on training, students receive intensive vocational English as a Second Language instruction. The program also offers support services such as bilingual tutoring, personal counseling and help in both finding and retaining a job. This type of comprehensive approach to vocational education for the limited English proficient individual is based on a model known as bilingual vocational training, or simply "BVT".

The purpose of this document is to provide insight into the Vocational English as a Second Language (VESL) component of the program. (For further information on the general structure and workings of the program, refer to the Project BEST Program and Curriculum Overview).

II. Description of VESL Component

The VESL component is an essential part of the vocational program because our students are non-native English speakers. Although there are bilingual tutors to assist the students in understanding the technical aspects of training, the English language class is taught only in English. Many of the students have studied English in their native countries or have lived in the United States for years. They have good listening comprehension skills; they can understand most everything spoken to them. However, most are sorely lacking in their production skills --their ability to reply and to initiate speech in English. Consequently, the VESL curriculum which we have developed emphasizes active participation and production in English. This does not mean that we ignore essential reading and writing skills, for they too are taught, but the emphasis of our program is on spoken English.

More specifically, since it is a vocational English as a Second Language program, the emphasis of the curriculum is to teach English which would be used on the job. This basically entails two aspects. One aspect of the curriculum includes the general language skills needed for getting and maintaining most jobs, e.g., how to request information, how to ask for clarification, and how to greet and talk to customers, co-workers, and supervisors. The other aspect of the curriculum is more job specific, i.e., the technical English one would need to know if working in the field of heating and air conditioning. It is an exciting program in that we are actually teaching our students English which directly applies to the kind of work which they are pursuing. Instead of having them identify chalkboards and erasers and other classroom objects, for example, they identify tools and parts of systems. The program is very practically oriented.

III. Incorporating Technical English into Instruction

To help the VESL instructor in the teaching of the job-specific competencies, the VESL instructor in our program attends the vocational instruction component for one hour each day. In this way, the instructor becomes at least somewhat familiar with the material and vocabulary being taught in the lab. In addition, the VESL instructor goes over the lab textbook reading assignments with the students to help them work through the more difficult English structures in their text, which was not written for ESL students. The VESL class is actually held right in the lab itself, making for easy reference to tools and equipment mentioned in the textbook or by the lab instructor. All of these things help the VESL instructor to incorporate some of the technical terminology into the English language instruction.

Sometimes, however, having a basic technical knowledge of the content area can pose some problems for the VESL instructor. An inherent difficulty is incorporating the technical English into the language instruction without actually teaching the technical content. Sometimes the two seem inseparable. For example, the instructor may want the students to practice the structure "used for" and wants to make it relevant to what the students are learning in the lab or from their textbook. So the instructor asks the question, "What is this tool used for?" He/she has a specific answer in mind based on the textbook readings or what was previously taught in the lab. If the student answers even slightly differently than expected, the teacher is at a loss because of a lack of knowledge in the technical content area. The VESL instructor has inadvertently put him/herself in the position of

teaching the technical content which he/she is not expected to know or teach. A brief discussion then takes place with other students offering answers or explanations. Eventually, the lab instructor must be consulted for the correct answer(s) to the question. In short, a simple practice exercise using a particular grammatical structure can turn into something much more complicated. VESL instructors must always be aware of exactly what kind of information they are soliciting from their students. When a variety of answers is possible, it is helpful for everyone involved if the instructor puts parameters on those answers by specifying the source from which those answers can be derived, such as by prefacing questions with, "According to page _____ of your textbook,...". This will help to minimize the "technical difficulties" VESL instructors can get themselves into.

IV. General Overview of the VESL Curriculum

The curriculum itself is primarily functionally based as opposed to grammatically or situationally based. Our goal is to incorporate the grammatical forms the students would most use on the job. Sometimes a review of basic grammar is a prerequisite to the teaching/practicing of these forms. Thus, although an attempt has been made to incorporate as many grammatical structures as possible, the curriculum is not grammatically comprehensive. Moreover, the grammatical structures listed in this VESL Curriculum are not necessarily introduced in a sequence of increasing difficulty. The competencies as well as their accompanying grammatical forms are to be used as a reference and guide for other VESL instructors to pick and choose as is appropriate for

their programs. It is left to the discretion of the VESL instructor which competencies and grammatical forms to emphasize and in what order.

Ideas for the general vocational ESL competencies listed in this curriculum were partially derived from various VESL texts (of which there is not an abundance), for instance, Speaking Up At Work. The VESL competencies which are more job specific are considered necessary for training and work in the heating, refrigeration and air conditioning field. The specific Project BEST vocational competencies (see pages 14-15) were formulated by the program lab instructor and project coordinator on the basis of a refrigeration lab manual which was specifically developed for this program by Allen Gandy from Kalamazoo Valley Community College, Kalamazoo, Michigan.

V. Description of VESL Competency List and Sheets

Included in this VESL curriculum is a listing of the Project BEST VESL competencies (pp.16-18). Each competency is the focus of a "competency sheet" which offers information relevant to the teaching of that competency. As seen on the first competency sheet, particular grammatical and language forms correspond to the competency to be taught. These appear under the section heading "Grammatical/Language Forms". The next section, "Language Samples", provides examples of these grammatical/language forms. The language samples are actually mini-dialogs including a host of speakers: students, instructors, workers, supervisors, receptionists. The point of the language samples is to provide a meaningful context in which the grammatical/language forms can be presented. The language samples are, as their label

indicates, merely samples and are to be used and manipulated as best benefits the class. The next section on the competency sheets is "Related Language Items". These include points such as the socio-cultural aspects of the language. For instance, under the competency "Introduce self and others", other aspects to take into consideration aside from the grammar/language forms are handshaking customs, order of introduction, and differences in register. These are things which a native speaker may take for granted as common knowledge but may be unknown to the non-native speaker.

The next section on each competency sheet is called "Suggested Activities". These include activities such as group and pair practice using dialogs, substitution drills and flash cards. Role playing, for example, is a well-liked activity because of its spontaneous and realistic nature. The student may or may not play himself in the role play. Role plays are especially useful when practicing interviewing techniques. Demonstrations are another way of getting students actively involved in the language learning process. Students demonstrate a particular procedure and explain each step along the way what they are doing and why. "Strip Stories" are also beneficial in helping students remember and verbalize steps in a procedure. This activity can be done as a whole class or in smaller groups. Each student receives between one and three strips of paper, each indicating a particular step to a procedure. The students must orally discuss among themselves the sequence of the steps without showing each other their strips. Once they have decided on a sequence, they are then allowed to lay the strips down, read the steps, and make any necessary adjustments. Everyone gets involved and has fun in the process. The "Suggested Activities" section

is to be seen as a springboard for VESL instructors in developing their own activities. Finally, references to worksheets with reading and writing exercises are also included in this section. The actual worksheets and instructional materials follow the competency sheets. Some review worksheets are found at the end of competency groups.

The last item on the competency sheets is called "Resources". Listed are students textbooks and workbooks, instructional texts for teachers, and booklets which might be helpful to the VESL instructor in preparing lesson plans. It is by no means a complete list.

In summary, the VESL curriculum and the suggestions offered in it have been designed to be an aid to VESL instructors, especially in the field of heating, refrigeration and air conditioning. We hope it will serve that purpose.

VI. Student Profile, Progress and Evaluation

The students in our program are of Polish or Hispanic origin. They have ranged from 18 to 59 years of age. Many of the students have full-time or part-time jobs in the evening as well as other responsibilities to their own families. These responsibilities are in addition to their 9:00 a.m. to 3:00 p.m. vocational training schedule here at Oakton College. For several, it is the first time they have been back in school for years. They are indeed what is commonly referred to as "non-traditional students".

ESL instructors who are accustomed to working with a more academic type student and program must make the necessary adjustments to adequately serve this unique student population. These adjustments include realizing that for the most part additional study outside of the classroom is limited, that school is generally not the students first priority, and that for some, being in school after a long absence is an intimidating experience.

ESL instructors must realize that they are now VESL instructors and that the emphasis of the English language instruction is no longer on academic English but rather on vocational English. In a like manner, the methods used for evaluating and assessing the students' progress will also be different in a vocational program than in an academic one.

Before entrance into the program, students are screened for their English language abilities. We try to limit the program to students of intermediate level because they must be able to understand the basic vocational material when it is presented in English. Despite our screening attempts, students' abilities in the English language

invariably differ. They have ranged from high beginning to high intermediate level upon entry. Moreover, not only do the students vary in their English language competency, but because each student is unique in his/her abilities, experience, and background, individual students will vary in how much and how quickly they assimilate the material presented. Consequently, we try to incorporate as much as possible an individual learning approach in our teaching methods.

In our progressive as well as overall evaluation of our students an individualistic approach is also taken. This does not mean that there are not general requirements to be fulfilled by all students, but rather that the goal of the program is to help students progress to a higher level in their English language abilities. For each student that progress will look a little different because each starts at a different point. For that reason we do not give out letter grades throughout the course or in the final analysis. The course is pass/fail. The student passes if he/she has made a sincere effort to learn and has completed all the course requirements (attendance,classroom participation, homework, quizzes, and exams). Weekly quizzes are given over the fifteen week period to help the students evaluate their own progress. It is exciting to observe the slow but consistent progress of a student who starts out on the first quiz with a score of 35% and gradually improves throughout the course, ending up with a 61% on the last quiz. Has that student failed because his final score is low? In our estimation, he has not failed; he has progressed significantly.

The VESL and lab instructors are also required to evaluate students' progress on a quarterly basis. Every four weeks an evaluation form is filled out for each student regarding their class performance

and overall progress. Ratings for progress include good, satisfactory, needs improvement, and unacceptable. These evaluation forms are useful in that they make clear to the instructors, tutors, and administrative staff which students are having difficulty and need special attention. It is a tremendous aid for the counselor in advising the student and finding out what the root of the problem is.

VII Curriculum and Program Evaluation

The evaluation of the curriculum and program is a constant process. As the instructors work with the students and get feedback from them, they discover new areas to teach or emphasize. The VESL instructor and lab instructor are also constantly exchanging information and helping each other to make modifications in the material they present to the students. To illustrate, the lab instructor might tell the VESL instructor which points in the reading assignments to cover and which ones to pass over. The lab instructor might also indicate English language problems there are in dealing with the students. In our program, for example, the vocational instructor noticed that although the students seemed to understand a certain procedure, they were unable to explain that procedure in English. Consequently, emphasis was placed on explaining procedures in the VESL class. Similarly, the VESL instructor noticed that students simply were not picking up much of the technical vocabulary. The suggestion was made to the lab instructor to write key vocabulary items on the board and to also illustrate or demonstrate in a simplified manner these vocabulary items or

procedures. The lab instructor did this and students began to understand much more than they had initially.

Employers in the field of heating, refrigeration and air conditioning, especially those who have hired our students, have also influenced our curriculum with their perspective as to what language skills are important on the job. They have indicated that one of the most important needs for employees is to be able to communicate with customers. As a result, we began to emphasize more those competencies related to interacting with customers.

In conclusion, the evaluation of our students, curriculum, and program is an ongoing process which matures even as we do in our understanding of how language and people interrelate.

Project BEST

Building Energy Maintenance
Vocational Lab

Vocational Competencies

for Project BEST

Bilingual Vocational Training

Heating, Refrigeration, and Air Conditioning

A. Soldering and Brazing Tubing

1a. Form various tube and fitting connections using soft soldering.
1b. Form various tube and fitting connections using silver brazing.

B. Measuring Resistance, Voltage and Current

2. Measure resistance using a volt ohm meter (vom).
3. Measure voltage in an electrical circuit using a vom.
4. Measure current in an electrical circuit using an ammeter.

C. Applying Electrical Theory To Circuits

5. Calculate values for current, resistance and voltage.
6. Build a series circuit and measure the resistance, voltage and current values in the circuit.
7. Build a parallel circuit and measure the resistance, voltage, and current values in the circuit.
8. Build a combination circuit, and measure the resistance, voltage, and current values in the circuit.
9. Wire a 120 volt branch circuit.
10. Test electrical components and identify defective components.

D. Using Gages

11. Use pressure and vacuum gages to determine the pressure of the refrigerant system.

E. Checking and Servicing Refrigeration Systems and Controls

12. Locate repair and specification information using a manufacturer's service manual.
13. Test refrigerant system for non-condensables.
14. Evacuate a refrigeration system.
15. Charge a refrigeration system.
16. Check refrigerant charge in refrigeration system for temperature and suction pressure.
17. Transfer refrigerants from one cylinder to another.
18. Locate and repair leaks in a refrigeration system.
19. Replace filter-driers.
20. Correct restrictions in capillary tubes.
21. Check and/or replace a compressor overload.
22. Check operation of compressors with service valves.
23. Test a compressor for electrical and mechanical functions.
24. Replace a hermetic compressor.
25. Remove and install an evaporator.
26. Locate and repair leaks in an evaporator.

E. Checking and Servicing Refrigeration Systems and Controls (cont'd)

27. Check and service air-cooled condensers.
28. Install and adjust a thermostat according to manufacturer's specifications.
29. Identify and record defects of a refrigeration system.
30. Replace solenoid valves.
31. Check and replace current relays.

F. Replacing & Adjusting Heating Devices

32. Install and/or replace a furnace fan limit switch.
33. Adjust the fan/limit controls according to predetermined settings.
34. Light pilot and adjust burner.

Project BEST

VESL

Vocational English as a Second Language Competencies for Project BEST

A. Job Safety

1. Briefly describe appropriate clothing and personal safety equipment for lab and job.
2. Briefly describe proper maintenance of work area and tools.
3. Identify types and uses of fire extinguishers.
4. Understand and respond to warnings on signs, labels, and service manuals.
5. Identify potential hazards and state how to correct them.
6. Warn others of hazards.
7. Report accidents in simple terms.
8. Describe proper lifting procedures.

B. Tools and Equipment

1. Identify a service technician's tools.
2. Identify parts of a heating system.
3. Identify parts of a refrigeration/air conditioning system.
4. Describe function and usage of work related supplies with appropriate descriptors.
5. Describe function and usage of work related equipment and tools.

C. Requesting Information

1. Indicate shortage of supplies.
2. State need to replace defective part.
3. Borrow tools or equipment.
4. State problem and ask for assistance from co-worker, instructor, or supervisor.
5. Request supervisor/ trainer to check work.

D. Giving and Receiving Information

1. Describe heating and refrigeration/air conditioning related procedures.
2. Report on progress of a specific task.
3. Report on a procedure completed.
4. Respond appropriately to positive and negative feedback.
5. Offer explanation or apology for incomplete or unsatisfactory work.
6. Respond to inquiry by giving an oral diagnosis of mechanical problem or malfunction.

E. Clarification

1. Express understanding or lack of understanding.
2. Ask someone to repeat a word, phrase, or set of instructions.
3. Ask someone to speak more slowly.
4. Ask someone to pronounce or spell a word.
5. Request meaning of word, phrase, sentence, or abbreviation.
6. Request name or function of an object or substance.
7. Verify comprehension by repeating a word, phrase, or set of instructions.

F. Reading Skills

1. Use a table of contents and index to locate information.
2. Understand and use technical graphs and charts.
3. Locate parts in a parts catalogue; give specifications, prices, etc.
4. Summarize a set of procedures from lab manual.
5. Summarize a brief reading passage from textbook.
6. Summarize instructions from service manuals.

G. Writing Skills

1. Write names of parts and services commonly used on invoices.
2. Write brief job-related messages.

H. Giving and Asking for Locations/Directions

1. Ask for location of desired or needed objects.
2. Explain location of object relative to other objects or storage facilities.
3. Direct someone to a location within a building.
4. Explain location of residence or important buildings relative to city landmarks.
5. Following oral instructions, locate places on a map.
6. Request driving directions to a specific location.
7. Give driving directions to a co-worker.

I. Socializing

1. Introduce yourself and others.
2. Greet a customer, co-worker , or supervisor.
3. Respond appropriately to greetings, statements, and inquires from customers, co-workers, and supervisors.
4. Hold a social conversation with a customer, co-worker, and supervisors.
5. End a conversation; say good-bye.

J. Telephoning

1. Call in an emergency.
2. Call in sick/late to job or class.
3. Call to request information or assistance.
4. Call to set up an appointment.
5. Call in to order parts.
6. Take written telephone messages.

K. Specialized Job Seeking/Keeping Skills

1. Call for information about job opening; make appointment for interview.
2. Respond to newspaper advertisement by writing letter of application (sample letter).
3. Fill out job application.
4. Respond to interview questions about job interest, work history, educational background, family, health, transportation, salary, etc.
5. Ask questions regarding work conditions, employment policies, salary, benefits, etc.
6. State desired job and shift preference and starting date.
7. Request time off or schedule change.
8. Report absence or tardiness.

A. Job Safety

Project BEST

VESL COMPETENCY A1 : Briefly describe appropriate clothing and personal safety equipment for lab and job.

GRAMMATICAL / LANGUAGE FORMS: Modal-should, infinitive phrase, present continuous.

LANGUAGE SAMPLES:

Instructor: Why should you wear work shoes when you are working on a system?

Student: (You should wear work shoes) to protect your feet (from falling objects.)

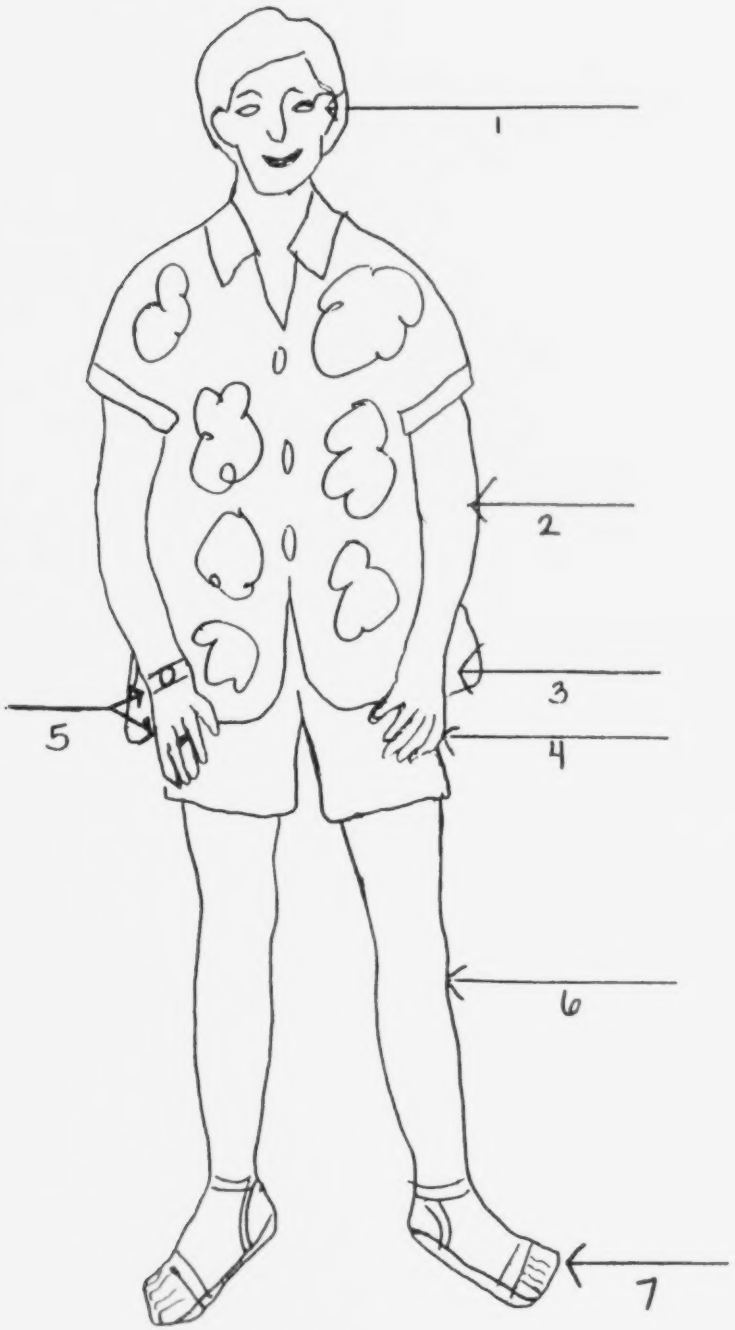
RELATED LANGUAGE ITEMS: Teach/Review parts of body and articles of clothing.

SUGGESTED ACTIVITIES: Flashcards- pictures of safety equipment
Clothing worksheet, "should" worksheet

RESOURCES:
Let's Work Safely p.12-29
Speaking Up at Work- p.63, 70-71
Developing Shop Safety Skills- p.29

JOB SAFETY WORKSHEET

Instructions: Fill in the blanks. Tell what the person should or shouldn't wear in the lab or an the job.



1. He should wear _____.
2. He should wear a _____ shirt.
3. He shouldn't wear _____ clothing.
4. He should wear _____.
5. He shouldn't wear _____.
6. He should wear _____ pants.
7. He should wear _____.

Answers:

1. safety goggles/safety glasses
2. long-sleeved
3. loose-fitting clothing
4. gloves
5. jewelry
6. long
7. work shoes/ safety shoes/ steel-toed shoes

JOB SAFETY WORKSHEET

Instructions: Answer the following questions in sentences. Use should in your answers. Do not repeat any answers.

1. What should a person wear to protect his/her arms from flying sparks?

2. What should a person wear when working with sharp or heavy objects?

3. What should a person wear to protect his/her eyes from flying particles?

4. What should a person wear so that his/her clothing won't get caught in a machine?

5. What should a person not wear because it could get caught on a machine?

6. What should a person wear to protect his/her legs from injury?

7. What should a person wear to protect his/her toes and feet from falling objects?

Answers:

1. long-sleeves
2. gloves
3. safety goggles/ safety glasses
4. close-fitted clothing
5. jewelry
6. long pants
7. work shoes/ safety shoes/ steel-toed shoes

A. Job Safety

Project BEST

VESL COMPETENCY A2 : Briefly describe proper maintenance of work area and tools.

GRAMMATICAL / LANGUAGE FORMS: Imperatives, Adverb of Frequency/Manner Adjectives.

LANGUAGE SAMPLES:

Instructor: Name two maintenance practices for work area and tools.

Student: Always return all materials and tools to their proper place and keep storage cabinets clean and orderly.

RELATED LANGUAGE ITEMS: Review names of tools, Go over shop safety rules- eg., Do not overload circuits. Do not keep flammable substances near sources of heat. Always clean up spills and debris on floor.

SUGGESTED ACTIVITIES: Ask students to identify in diagram improper maintenance of work area and tools.

RESOURCES: Let's Work Safely p.70, 71

Developing Shop Safety Skills- p.12, 13

Speaking Up at Work- p.71-73

25 Taken from Linda Mrowicki's book, Let's Work Safely!

A. Job Safety

Project BEST

VESL COMPETENCY A3 : Identify types and use of fire extinguishers.

GRAMMATICAL / LANGUAGE FORMS: There are, used for, yes/no question-Be

LANGUAGE SAMPLES:

Instructor: What types of fire extinguishers are there?

Student: There are foam, carbon dioxide and dry chemical fire extinguishers.

Student: Is type C fire extinguisher used for electrical fires?

Instructor: Yes ,it is.

RELATED LANGUAGE ITEMS: Vocabulary related to fires (ordinary combustibles, flammable liquids, grease, etc.) and fire extinguishers (foam, carbon dioxide, dry-chemical, etc.)

SUGGESTED ACTIVITIES:

Simulated demonstration of use of fire extinguishers. Have students locate nearest fire extinguishers and identify type of extinguishers.

RESOURCES:

Developing Shop Safety Skills

Let's Work Safely- p.86-88

Speaking Up at Work

FIGURE 78. Type ABC fire extinguisher for use in shops effective against all classes of fires.

Fire extinguishers are rechargeable and should be checked periodically for charge (Figure 80).

FIGURE 80. A fire extinguisher must be inspected regularly and be fully charged.

KIND OF FIRE		APPROVED TYPE OF EXTINGUISHER						
		MATCH UP PROPER EXTINGUISHER WITH CLASS OF FIRE SHOWN AT LEFT Important! Using the wrong type extinguisher for the class of fire may be dangerous.						
DECIDE THE CLASS OF FIRE YOU ARE FIGHTING...	...THEN CHECK THE COLUMNS TO THE RIGHT OF THAT CLASS	FOAM Solution of Aluminum Sulphate and Bicarbonate of Soda	CARBON DIOXIDE Carbon Dioxide Gas Under Pressure	SODA ACID Bicarbonate of Soda Solution and Sulphuric Acid	PUMP TANK Plain Water	GAS CARTRIDGE Water Expelled by Carbon Dioxide Gas	MULTI-PURPOSE DRY CHEMICAL	ORDINARY DRY CHEMICAL
A CLASS A FIRES Use These Extinguishers ORDINARY COMBUSTIBLES • Wood • Paper • Cloth, Etc.		A B		A	A	A	A B C	
B CLASS B FIRES Use These Extinguishers FLAMMABLE LIQUIDS, GREASE • Gasoline • Paints • Oils, Etc.		A B	B C				A B C	B C
C CLASS C FIRES Use These Extinguishers ELECTRICAL EQUIPMENT • Motors • Switches, Etc.			B C				A B C	B C

FIGURE 79. Matching fire extinguishers to classes of fires.

Taken from Developing Shop Safety Skills 28

A. Job Safety

Project BEST

VESL COMPETENCY A4 : Understand and respond to warnings on signs, labels and service manuals.

GRAMMATICAL / LANGUAGE FORMS: What question- Do, mean

LANGUAGE SAMPLES:

Student: What does "flammable" mean?
(combustible)
(caution)
(high voltage)
(adequate ventilation)

Instructor: Flammable means that something can easily start on fire and burn quickly.

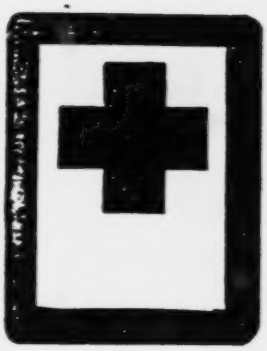
RELATED LANGUAGE ITEMS: Colors related to emergency/danger: red, black, and yellow.

SUGGESTED ACTIVITIES:

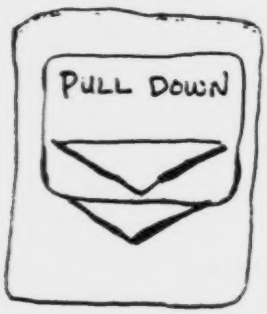
RESOURCES: Let's Work Safely - p.21, 27, 38, 80, 84
Speaking Up at Work- p-73, 74

JOB SAFETY

Instructions: Match the number of the picture with the words of the sign.



1



2

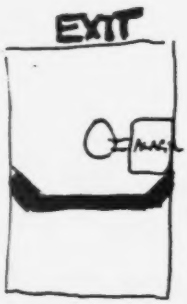
3

4

5

6

7



8

_____ a. Danger: High Voltage
_____ b. First Aid
_____ c. Fire Extinguisher
_____ d. Fire Alarm
_____ e. No Smoking
_____ f. Flammable
_____ g. Emergency Exit
_____ h. Eyewash Station

INSTALLATION INSTRUCTION

GAS FIRED FURNACES
MODELS PAFS, PAFC
STANDING & CYCLING PILOT

Supersedes: Nothing | 650.15-N10 (683)

035-06026

GENERAL

These compact furnaces are styled for space saving installation and include a wide range of heating capacities.

All furnaces are natural gas fired, with either standing (continuously burning) pilot or spark ignition. Standing pilot models are easily convertible for operation with liquified petroleum (propane) gas.

The furnaces are completely factory assembled, wired and tested to assure dependable and economical operation.

The cabinets are fabricated from heavy-gauge steel, and coated with a durable, baked enamel finish.

All models feature low operating sound levels, and are equipped with protective safety devices.

REFERENCE

Installer should pay particular attention to the words: NOTE, CAUTION, and WARNING. NOTES are intended to clarify or make the installation easier. CAUTIONS are given to prevent equipment damage. WARNINGS are given to alert the installer that personal injury and/or equipment damage may result if installation procedures are not handled properly.

INSPECTION

As soon as a unit is received, it should be inspected for possible damage during transit. If damage is evident, the extent of the damage should be noted on the carrier's freight bill. A separate request for inspection by the carrier's agent should be made in writing.

Also, before installation, unit should be checked for screws or bolts which may have loosened in transit.

NOMENCLATURE

P A FS -L D08 N 060

- 060 — Nominal Capacity (MBH)
- N — Type Gas: N = Natural P = Liquid Propane
- D08 — Type Drive* and CFM: *D = Direct-drive
- -L — Voltage Code (-L = 115-1-60)
- FS — Product Identifier: FS = Upflow, Std. Pilot; FC = Upflow, Spark Ign.
- A — Product Generation: A = 1st, B = 2nd, etc.
- P — Product Category: P = Furnaces

LIMITATIONS

Size of unit for proposed installation should be based on heat loss calculation made according to the methods of the Air Conditioning Contractors of America (ACCA).

Check rating plate to make certain the unit is equipped to burn the type of gas supplied.

Do not install this unit in a mobile home. This furnace is designed for installation in a building constructed on-site.

A furnace installed in a residential garage shall be located so that all burners and burner ignition devices are located not less than 18" above garage floor, and located or protected to prevent damage by vehicles.

WARNING: Blower and burners must never be operated without blower door in place. This is to prevent drawing of dangerous fumes (which could contain hazardous carbon monoxide) into the home, which could result in personal injury or death.

Where local regulations are at a variance with instructions, installer should adhere to local codes, or in the absence of local codes, the installation must conform with American National Standard, National Fuel Gas Code (Z223.1-1980).

LOCATION

Choose location for unit near a chimney or vent. Allow clearance from combustible materials as listed under "CLEARANCES", insuring that service access is allowed for both the burner and blower. Unit must be installed in a level position.

When the furnace is used in conjunction with a cooling unit, the furnace must be installed parallel with or on the upstream side of the cooling unit to avoid condensation in the heat exchanger. When a parallel flow arrangement is used, the dampers or other means used to control air flow shall be adequate to prevent chilled air from entering the furnace, and if manually operated, must be equipped with means to prevent operation of either unit unless the damper is in the full heat or cool position.

CLEARANCES

These units are A.G.A. design certified for closet installation* on a wood floor, but must not be installed on (or adjacent to) carpeting, tile, or any other combustible material. Minimum clearance from any surface of enclosure is listed in Table 1. For installations other than closet, clearances listed are from combustible material. If unit is installed in a utility room, door to room should permit removal of the largest component. A 30 inch service access must be provided at front of the unit.

A. Job Safety

Project BEST

VESL COMPETENCY A5 : Identify potential hazards and state how to correct them.

GRAMMATICAL / LANGUAGE FORMS: Would like, a lot of, comparative adjective
There is/are

LANGUAGE SAMPLES:

Worker: I'd like to report an unsafe condition (a safety hazard).

Supervisor: What's the problem?

Worker: There's a lot of refrigerant in the air. We need better ventilation. (or There isn't a lot of light here. We need better lighting.)

RELATED LANGUAGE ITEMS: There is a lot of + non-count noun versus
There are a lot of + count noun

SUGGESTED ACTIVITIES: Check own lab for possible safety hazards.

RESOURCES: Speaking Up- p.64-65
Let's Work Safely- p.62-65

A. Job Safety

Project BEST

VESL COMPETENCY A6 : Warn others of hazards.

GRAMMATICAL / LANGUAGE FORMS: Imperative- positive and negative, Watch/ Look out (for), Thanks for +___ing Modal-could/might

LANGUAGE SAMPLES:

Student: Watch out (for the torch)! It's hot!

Student: Thanks for warning me.

Worker: Don't walk there! The floor is slippery. You could fall.

Worker: Thanks for telling me.

RELATED LANGUAGE ITEMS: Adjectives- hot, sharp, slippery, etc.

SUGGESTED ACTIVITIES:

RESOURCES: Speaking Up at Work- p.64-67

Let's Work Safely- p.78-81

Job Safety – Warning Others!

Instructions: Fill in the blanks with an appropriate word.

1. (Be) careful for the oil on the floor! You could (fall) (slip).
2. (Watch) out for the hot torch! You could (burn) yourself.
3. (Pay) attention to what you're doing! You (hurt) yoursely.
4. Don't (push) on the wrench! It could (slip) and (hit) you in the face.
5. Don't (bend) your back! You could (pull) a muscle.
6. Don't (distract) others while they are working! They could (have) an accident.
7. Don't (fill) refrigerant cylinders more than 85%! They could (burst).
8. Don't (smoke) near those gasoline cans. They could (ignite).

9. (Leave) the room if you're dizzy! Refrigerant fumes could (be) leaking.

10. Always (turn off) the electrical power when working on a refrigeration system. You could accidentally (touch) a live wire.

11. Always (wear) goggles and gloves when handling liquid refrigerant! You could (burn) yourself if there was a sudden leak.

12. Never (wear) jewelry in the lab or on the job. It could (get) caught in a machine or on a corner.

A. Job Safety. Project BEST

VESL COMPETENCY A7 : Report accidents in simple terms.

GRAMMATICAL / LANGUAGE FORMS:
- want + infinitive
- reflexive pronoun
- past continuous
- adverbial clause - manner
- simple past

LANGUAGE SAMPLES:

Worker: I want to report an injury.

Supervisor: What happened?

Worker: I burned myself while I was using the torch.

(John burned himself while he was using the torch.)

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES:

Substitution Drill- I burned myself, he burned himself, she cut herself

Role-play- reporting injuries to supervisor or co-worker.

RESOURCES:

Let's Work Safely- p. 90-96

DIALOGUE

A: Hi, Bob.

B: Hi, Bill. How are you doing?

A: Okay. How about yourself?

B: Pretty good. Thanks. Say, did you hear about Al?

A: No, I didn't. What happened?

B: Well, he had a minor accident in the lab yesterday. He wanted to use someone's torch after they were finished using it. Neither of them were thinking. Al grabbed the torch by the hot end and burned his hand.

A: Was it serious?

B: No, but it is painful with all those blisters on his hand.

A: He should be more careful.

B: Yeah, but I think we all need to be more careful.

A: Yeah, you're right.

A. Job Safety

Project BEST

VESL COMPETENCY A8 : Describe proper lifting procedures.

GRAMMATICAL / LANGUAGE FORMS: Imperative, Imperative + if clause

LANGUAGE SAMPLES:

Instructor: What is the proper procedure for lifting an object?

Student: First, estimate the load to lifted. Get help if you need it. If you work with someone, work as a team.

RELATED LANGUAGE ITEMS: Review parts of body and terminology related to body position-bed, kneel, twist, shift, etc.

SUGGESTED ACTIVITIES: Demonstration - by instructor and students of lifting procedure

Strip story - divide students into groups; each group receives a set of steps in jumbled order & must place strips in correct order.

RESOURCES: Developing Shop Safety- p.57

Let's Work Safely- p.41-45

2. AVOIDING INJURIES FROM LIFTING

The old saying of "use your head and save your back" is appropriate to work in the shop. One out of five industrial injuries involves the back. Medical expenses amounting to more than 25 percent of treatment costs are incurred in treating back injuries. But the cost in dollars is nothing compared to the potential lifelong pain and limited movement as the result of back injuries. In addition to back problems, improper lifting can cause muscle spasms, ruptured

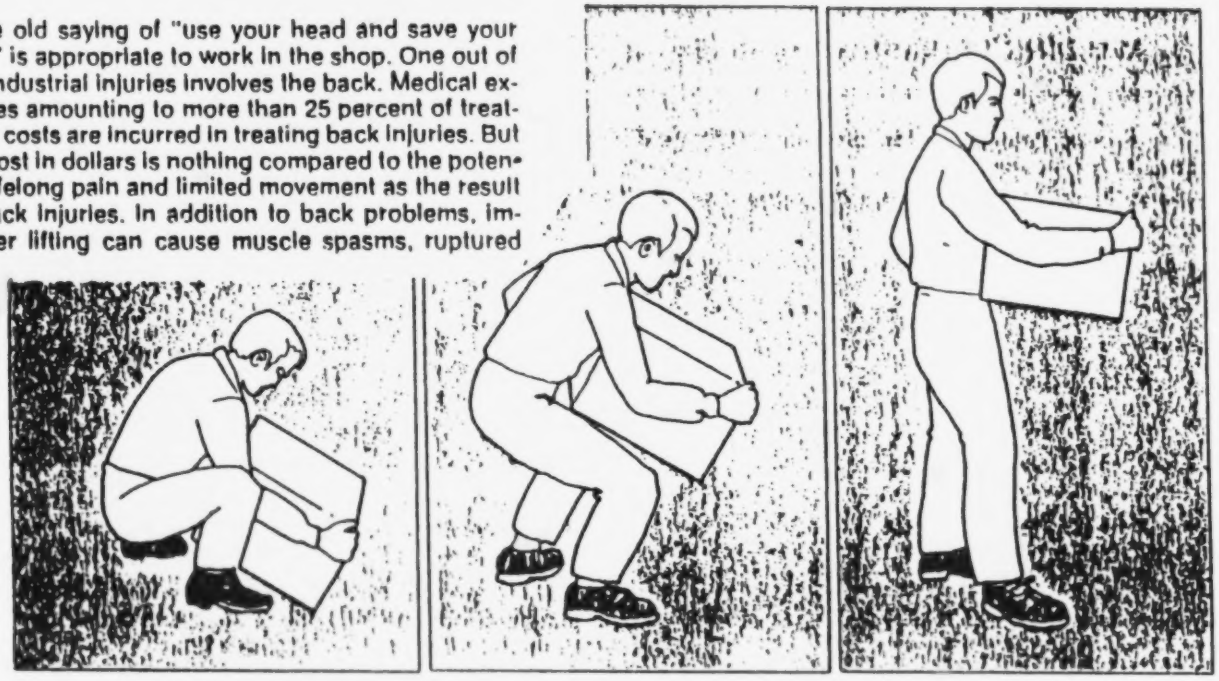


FIGURE 116. Lifting safely.

and torn ligaments. Use hoists, jacks, carts and wheel trucks to lift and move dead weight. Rely on mechanical devices or the assistance of others to move heavy objects. Refer to pamphlets No. 193.19, A New Way to Lift, National Safety Council and OSALS–175 Safe Lifting, U. S. Department of Labor Training Program.

Avoid lifting whenever possible. Move heavy objects by pushing, pulling, rolling or sliding. Avoid awkward positions (Figure 116). To lift properly, proceed as follows:

1. *Estimate the load to be lifted.*
   If there is any doubt, get mechanical assistance or that of another person. If you work with someone, work as a team. Don't be a show-off.
2. *Check your footing.*
   Avoid slippery or hazardous materials or areas. Spread your feet slightly (comfortably) with one foot slightly ahead of the other and along side the object.
3. *Bend knees, kneel or squat.*
   Don't bend your back to reach under the load. First get close to the object being lifted.
4. *Use blocking under objects to help get a hand hold and to prevent mashed fingers.*
5. *Get a good grip.*
   Be sure you can maintain your grip on an object. The surface must be free of oily or slippery material. Use gloves when handling sharp or rough objects.
6. *Let legs do the lifting.*
   To do the lifting, straighten your legs, letting the powerful leg, arm and shoulder muscles do the lifting. Remember, your back muscles are very thin as compared to the leg muscle bundles which are eight to ten inches in diameter.
7. *Shift the feet to turn.*
   When turning, shift the position of your feet rather than twist your body at the waist. This action eliminates twisting the spine and possible rupture of bone-separating cartilage.
8. *Lower the load.*
   In putting the load down to the floor from carrying position, bend the knees, keep the back straight, and use the leg and arm muscles to lower the load.
9. *Keep fingers and toes clear.*

Taken from Shop Safety Skills

Review of Safety

WORD FIND

Instructions: Which word does not belong with the other three words? Write the letter of that word next to the number.

1. _____
   a. pull
   b. wrench
   c. push
   d. slip

2. _____
   a. ignite
   b. explosive
   c. non-flammable gas
   d. combustibles

3 _____
   a. fire extinguisher
   b. emergency exits
   c. prevent
   d. fire alarm

4. _____ .
   a. glove
   b. injury
   c. safety goggles
   d. work shoes

WORD FIND

5. _____
   a. flying particles
   b. "mushroom" heads
   c. grind
   d. heavy

6. _____
   a. back muscles
   b. knees
   c. leg muscles
   d. lifting

7. _____
   a. heavy objects
   b. overload
   c. avoid
   d. injury

8. _____
   a. Watch out
   b. Be careful
   c. Pay attention
   d. Wet floor

9. _____
   a. electrical shock
   b. "live" wire
   c. in high concentration
   d. outlet

WORD FIND

10. _____

a. precaution
b. carelessness
c. injury
d. distract

11. _____

a. cadmium fumes
b. irritate
c. toxic
d. poisonous

Answer Key

1. a
2. c
3. C
4. b
5. d
6. a
7. b
8. d
9. c
10. a
11. b

B. Tools and Equipment

Project BEST

VESL COMPETENCY B1 : Identify a service technician's tools.

GRAMMATICAL / LANGUAGE FORMS: This/That, These/Those, What kind of, compound nouns, singular and plural noun forms.

LANGUAGE SAMPLES:

Instructor: What is this (called)?
Student: That's a wrench.
Instructor: What are these (called)?
Student: These are screwdrivers.
Instructor: What kind of wrench is this?
Student: That's a box socket wrench.

RELATED LANGUAGE ITEMS: Adjectives come before nouns.

SUGGESTED ACTIVITIES: Flashcards - with pictures of tools, names on back, good for pair activity.
Matching exercise - match names and tools or pictures of tools.

RESOURCES: Mordern Refrigeration and Air Conditioning- p.52

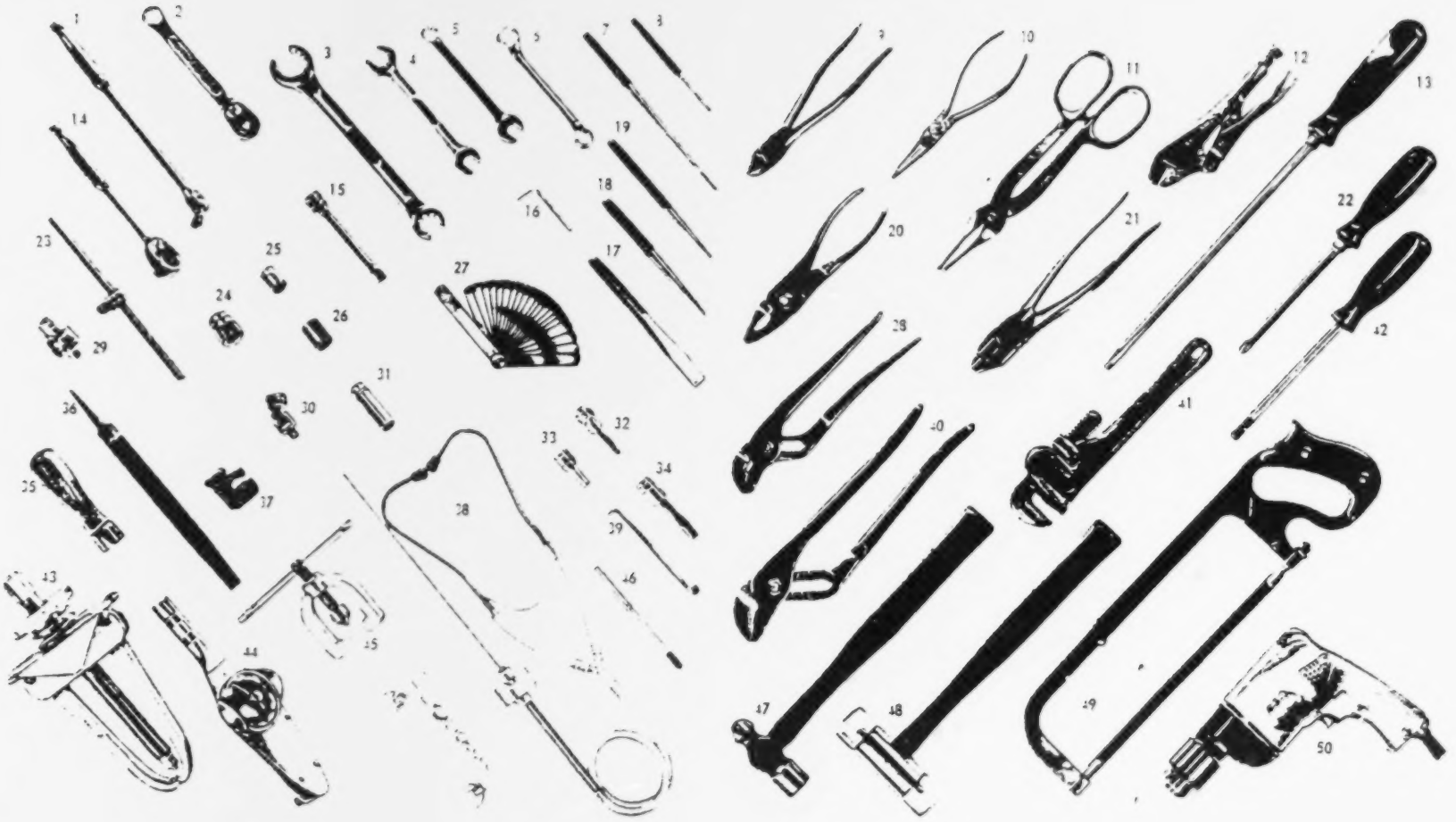


Fig. 2-40. Basic hand tool assortment for refrigeration service. 1—Nut spinner. 2—Wrench, refrigeration ratchet. 3—Wrench, flare nut. 4—Wrench, open end. 5—Wrench, double hex, combination. 6—Wrench, box socket – double hex offset. 7—Punch, taper. 8—Punch, pin. 9—Pliers, diagonal cutting. 10—Pliers, needle-nose. 11—Snip, tinner's. 12—Pliers, pinch-off. 13—Screwdriver, standard tip. 14—Handle ratchet. 15—Extension, 4-in. 16—Wrench, hex head (Allen). 17—Chisel, cold. 18—Punch, center. 19—Punch, starter. 20—Pliers, gripping – slip joint. 21—Pliers, lineman. 22—Screwdriver, Phillips. 23—Handle, sliding bar. 24—Socket, Weatherhead. 25—Socket, double hex. 26—Socket, magnetic. 27—Gage, feeler. 28—Pliers, interlocking joint. 29—Adaptor. 30—Universal joint. 31—Socket, double hex deep. 32—Socket, Phillips screwdriver. 33—Socket, clutch screwdriver. 34—Socket, standard screwdriver. 35—File handle. 36—File, half round. 37—Cutter, tube. 38—Stethoscope, mechanic's. 39—Screwdriver, offset. 40—Pliers, large, interlocking joint. 41—Wrench, pipe. 42—Screwdriver, clutch. 43—Puller, two-jaw. 44—Torque wrench, English-metric. 45—Flaring tool. 46—Screw starter. 47—Hammer, ball peen. 48—Hammer, plastic tip. 49—Hacksaw, hand. 50—Drill, electric.
(Snap-on Tools Corp.)

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B. Tools and Equipment

Project BEST

VESL COMPETENCY $_{B2}$: Identify parts of a heating system.

GRAMMATICAL / LANGUAGE FORMS: Yes/No question-present Do
Where question-pres. Be, Compound nouns,
Prepositonal phrases

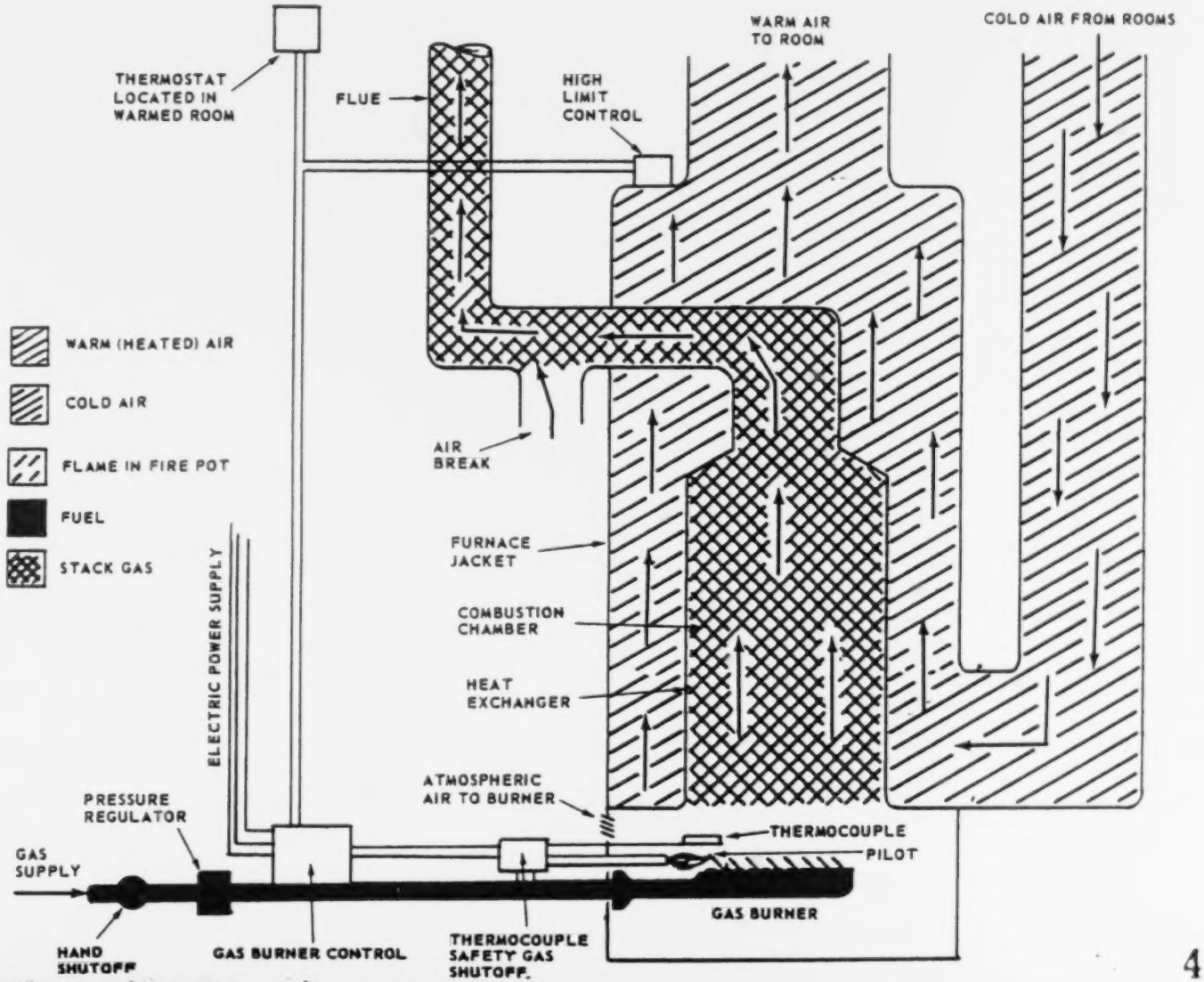
LANGUAGE SAMPLES:

Instructor:	Does the burner orifice supply gas to the burner?
Student:	Yes, it does.
Instructor:	Is the heat exchanger above or below the combustion chamber?
Student:	It's above the combustion chamber.
Instructor:	Where is the cold air entrance (located)?
Student:	It's (located) at the base of the furnace.

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES: Have a diagram of a heating system with names of parts missing; students fill in the names.
Students point out parts of system on an actual system.
Students formulate own question and ask classmates the answers.

RESOURCES: Mordern Refrigeration and Air Conditioning-
p.672-680


THERMOSTAT LOCATED IN WARMED ROOM
FLUE
HIGH LIMIT CONTROL
WARM AIR TO ROOM
COLD AIR FROM ROOMS
WARM (HEATED) AIR
COLD AIR
FLAME IN FIRE POT
FUEL
STACK GAS
AIR BREAK
FURNACE JACKET
COMBUSTION CHAMBER
HEAT EXCHANGER
ELECTRIC POWER SUPPLY
ATMOSPHERIC AIR TO BURNER
PRESSURE REGULATOR
THERMOCOUPLE
PILOT
GAS SUPPLY
GAS BURNER
HAND SHUTOFF
GAS BURNER CONTROL
THERMOCOUPLE SAFETY GAS SHUTOFF

B. Tools and Equipment

Project BEST

VESL COMPETENCY B3 : Identify parts of a refrigeration/air conditioning system.

GRAMMATICAL / LANGUAGE FORMS: Where question-pres. Be, What quest-pres.DO
Yes/No quest-pres. Do, Prepositional phrases

LANGUAGE SAMPLES:

Student: Where is the cooling coil (located)?
Instructor: It's on the low pressure side.
Student: What does the condensor coil do?
Instructor: It removes heat from the refrigeratant vapor.
Student: Does the pressure rise in the compressor?
Instructor: Yes, it does.
Student: Is the flow control on the low or high pressure side?
Instructor: It's on the low pressure side.

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES: Students formulate yes/no questions and information questions from statements and then ask each other the questions.

Students point out parts and function of these parts on actual systems or in a diagram.

RESOURCES: Modern Refrigeration and Air Conditioning- p.73-98

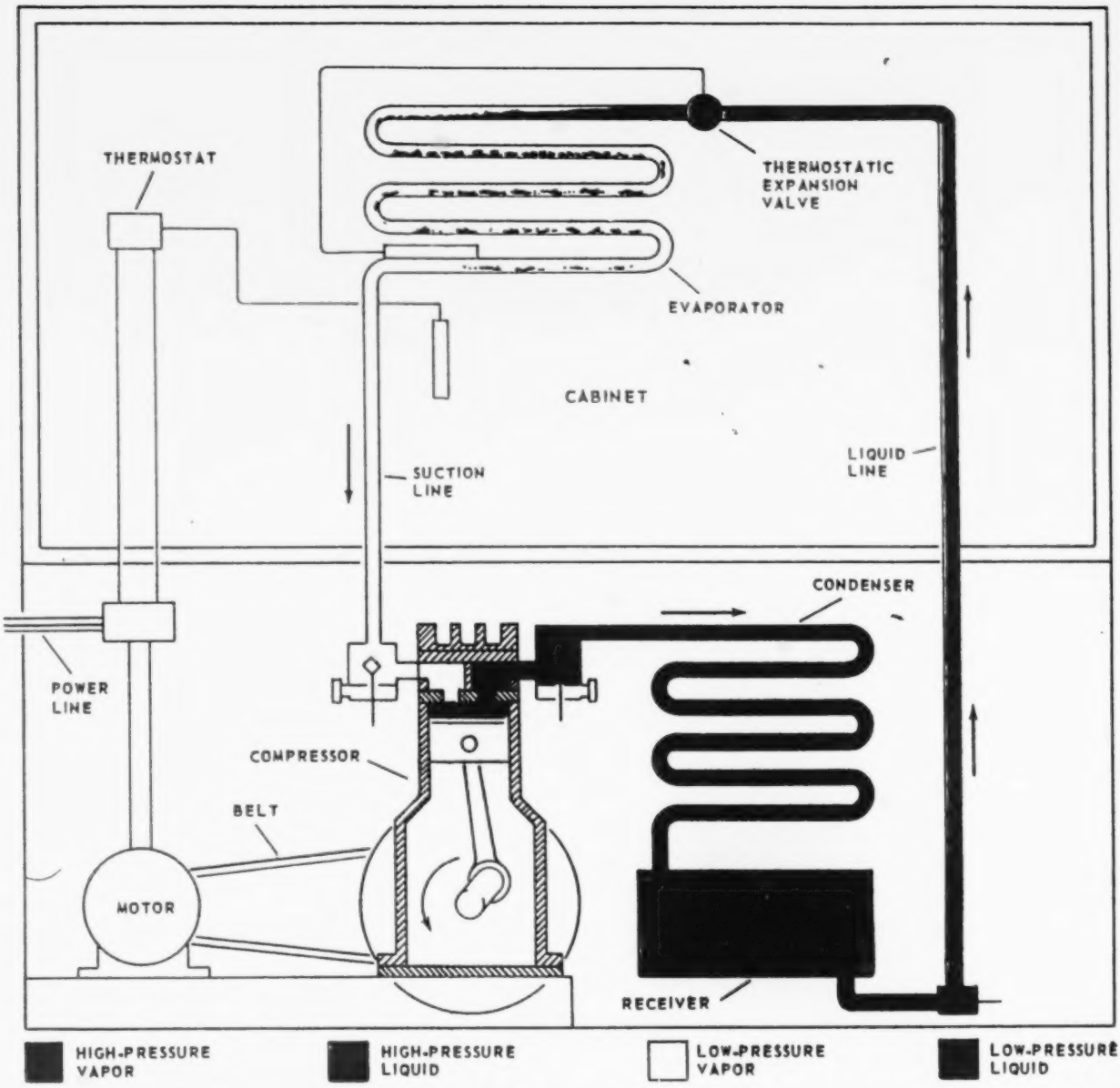


Fig. 3-5. Compression system using external drive (open) type compressor. Crankshaft seal is required at the place where the crankshaft extends through the crankcase of compressor.

The motor and the compressor drive are at atmospheric pressure. The pressure inside the crankcase will vary depending upon the refrigerant used and the temperature. Sometimes it may be considerably above atmospheric pressure; at other times, it may be below. Refrigerant vapor cannot be allowed to flow out or air to flow into the crankcase. Either would quickly ruin the operation of the system.

3-6 COMPRESSION SYSTEM USING HIGH-SIDE FLOAT REFRIGERANT CONTROL

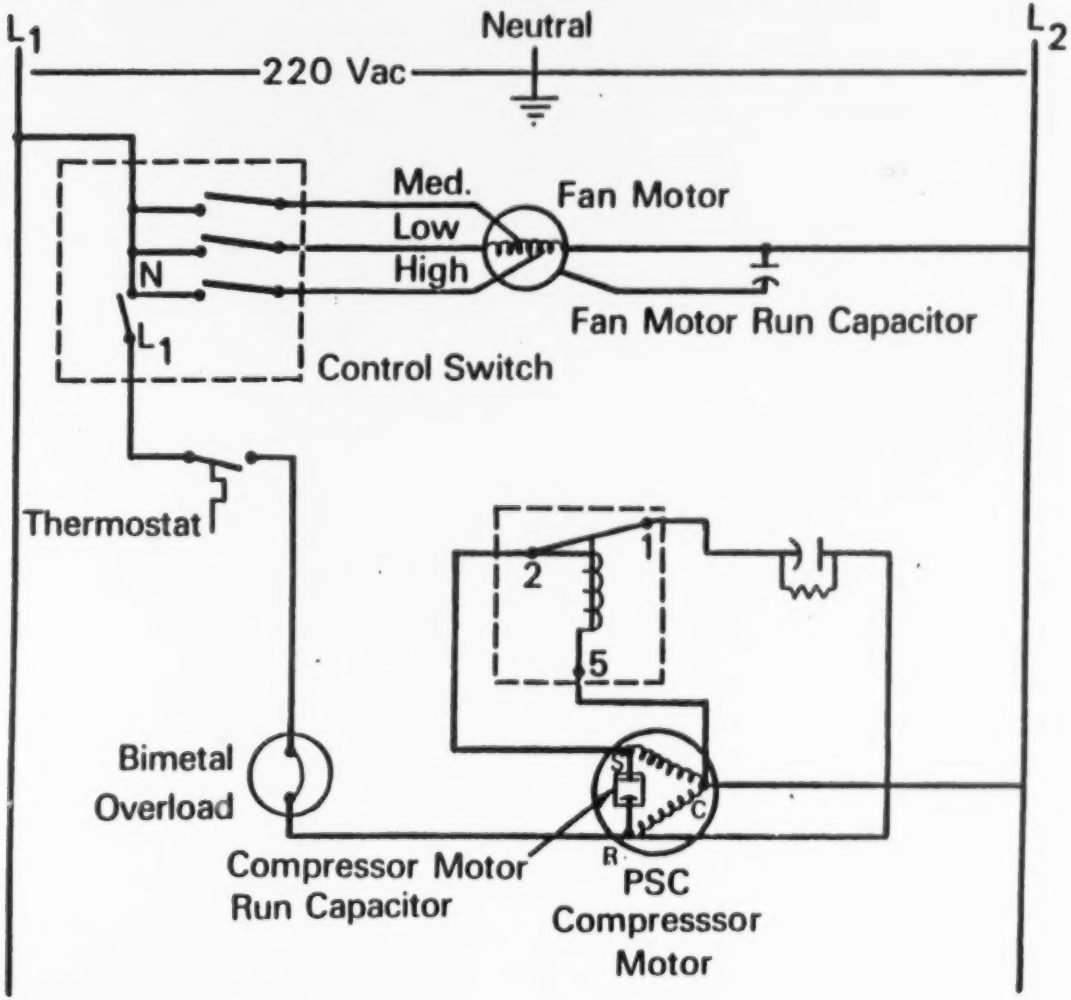
The high-side float system is a flooded system. The evaporator is always filled with liquid refrigerant.

Fig. 3-6 is a schematic diagram of this system. As th compressor runs, liquid refrigerant flows from the liquid lir into the high-side float mechanism.

As soon as enough liquid refrigerant has entered th high-side float mechanism, it will raise the float ball. Th refrigerant will then begin to flow through the control to th evaporator. Since the evaporator is under low pressure, th tubing connecting the high-side float and the evaporate should be insulated. A capillary tube refrigerant line frequently used.

If a different size line is used, it should have a weight valv at the evaporator to prevent the refrigerant from evaporatir in the connecting line. Fig. 3-6 shows a weight valve in th connecting line.

Window Air Conditioner Schematic



B. Tools and Equipment

Project BEST

VESL COMPETENCY B4 : Describe function and usage of work related supplies with appropriate descriptors.

GRAMMATICAL / LANGUAGE FORMS: What kind of, Modal question-should, tag question, compound nouns, adjectives

LANGUAGE SAMPLES:

Student:	What kind of refrigerant is this?
Instructor:	That's R-12 refrigerant.
Student:	Should I use R-12 or R-22 for this system?
Instructor:	You should use R-12.
Student:	I should use 3/4" tubing for that, right?
Instructor:	Yes, that's right.

RELATED LANGUAGE ITEMS: Measurements- in fractions.
Supplies include such things as tubing, gaskets, refrigerant, screws, fittings.

SUGGESTED ACTIVITIES: Students practice identifying and reading sizes and numbers of supplies from a list price catalog.

RESOURCES: Mordern Refrigeration and Air Conditioning- p.39, 44-45, 47

Thermal Capillary Tube Chaser Kit

This kit has 10 spools of lead alloy wire a few thousands of an inch smaller than the ID of the popular sizes of capillary tube. Cut a 3/8" piece of wire to use as a piston to be pushed through the tube by the hydraulic action of the thermal tube cleaner. After cleaning away the obstruction the lead wire will enter the evaporator where it will remain harmlessly. Kit complete with 10 sizes of lead wire, file, and a capillary tube gauging tool.

Complete Capillary Tube Chaser Kit

61706 Complete Chaser Kit Each **$43.20**

Thermal Capillary Tube Cleaner

This Cap-Check capillary tube cleaner is a portable hydraulic power unit to open restricted capillary tubes. Has 0–5000 lb. pressure gauge and protecting trigger valve that shuts off the gauge when pressure exceeds 5000 lbs. It holds enough oil for several jobs and may be easily refilled. A 30" heavy duty hydraulic hose may be used to connect the capillary tube or it may be directly connected. Power unit with hose, gauge, and handle.

No.	Cap. Tube Cleaner	Each
61705	Power-Unit	$112.70
61706	Metal Case	31.90
61707	Extended Base	22.32
61718	0–5000 Press Gauge	38.28
	Per Pkg of 12	Each
61710	Adapter Neoprene Seals	3.20

Thermal Capillary Tube Gauging Tool

Ten sizes of hardened steel wire .028, .031, .036, .039, .042, .046, .050, .055, .064 and .070 OD mounted in an aluminum holder. Wires used to gauge ID of capillary tubing to let you make an exact replacement.

No.		Each
61709	Capillary Tube Gauging Tool	$9.68

Watsco Strain-O-Kap

Combination strainer and capillary has 3 monel screens 60, 80, and 120 mesh. These screens strain the refrigerant and break up the turbulence and oil particles to deliver a clean and efficient supply of refrigerant to the capillary. With installation instructions. For refrigeration units 1/20 to 1/5 HP, water coolers to 1/4 HP, and freezers 1/4 to 1/3 HP. Have 7-1/2 Ft. cap tube.

No	Fitting	Each
2361	1/4" SAE	$10.50
2362	1/4" OD	8.16

Watsco 2-in-1 Brush

Easy cleaning of tubing and fittings, these stainless steel brushes are ideal for cleaning O.D. of the tubing and the I.D. of the fitting, for fast and secure soldering jobs. Brushes come with two tubing sizes and fit easily in your tool box and hold up in use. Also shown are replacement brushes for Part No. 1385 and 1395.

No	Description	Tube Size	Each
1385	Two in one brush	1/2" & 3/4"	$16.88
1395	Two in one brush	5/8" & 7/8"	16.88
1386	Set of Replace-	1/2"	6.62
1387	ment ID & OD	5/8"	6.62
1396	brushes for	3/4"	6.62
1397		7/8"	6.62

Small Size Capillary Tubing

Small size tubing in the sizes used to meter refrigerant flow. Soft drawn flexible tubing. In 100 ft. lengths.

No.	ID	OD	Per 100 Ft.
8100	.026"	.072"	$23.84
8101	.031"	.083"	29.14
8178	.036"	.087"	30.68
8128	.044"	.109"	42.16
8129	.050"	.114"	43.38
8149	.055"	.125"	52.20
8188	.064"	.125"	47.96
8189	.070"	.125"	46.72
8192	.080"	.145"	60.72

Reducing bushing fits in 1/4" OD solder fitting and takes 1/8" OD tubing.

11597	Per Pkg. of 10 Each	$ .50

Type K Soft Copper Tubing 60 Foot Coils

Type K soft copper tubing in 60 ft. coils mainly used for underground water lines. Wall thickness and weight per foot same as hard copper tubing.

No	OD	60 Ft. Length	300 Ft. Lots Per Length
8164R	5/8"	$ 58.26	$ 52.46
8167R	3/4"	74.84	71.06
8168R	7/8"	101.06	95.94
8169R	1-1/8"	134.80	127.86

Solid Copper Pipe Straps

Rustproof solid copper pipe straps with a reinforced rib. Ideal for running copper tube lines.

Sold Only In Lots of 25

No	OD Tube	Pkg Quan.	Pkg. Lot Each Piece	100 Lots Each
6437	3/8"	25		
6438	1/2"	25	$ .14	$ .12
6440	5/8"	25		
6441	7/8"	25	.30	.28
6442	1-1/8"	25	.34	.32
6443	1-3/8"	25	.44	.40
6444	1-5/8"	25	.48	.42
6445	2-1/8"	25	.52	.46

Plated Steel Straps For Copper Tubing

Strong, heavily zinc plated, steel straps for copper tubing lines. One hole mounting.

Sold Only In Lots of 50

No.	For Tube	Pkg. Quan.	Lot Each Piece
14160	1/4"	50	$ .26
14161	3/8"	50	.30
14162	1/2"	50	.32
14163	5/8"	50	.40
14164	3/4"	50	.48
14165	7/8"	50	.56

Watsco Strain-O-Kap

For hermetic units from 1/3 HP to 1 HP and for all temperature operations using either F-12 or F-22 refrigerants. Includes a 5/8" OD strainer with 60-80-100 monel screens. Has 1/8" cap. outlet and 3/8" inlet with bushing for 5/16" and 1/4" inlet. Has separate 1/8" hard drawn capillary tube 42" long .078 ID. Supplied with 3 different thicknesses of hard drawn bronze wire with instructions giving lengths and size to use to match the HP and temperature range of your unit.

1466	Complete Kit With Cap, Tube and Instructions Each	$11.16

Refrigeration Dehydrated And Sealed Soft Copper Tubing

Compare Our Prices You Will Find Them America's Lowest

NOTICE
World copper prices are fluctuating erratically. Our copper prices may go down or up depending on the market. However we guarantee to give you the lowest possible prices.

The standard soft dehydrated copper tubing is made in the wall thickness recommended by the Copper and Brass Research Association to the National Bureau of Standards. Each size has ample strength for its capacity. Fine, clean tubing properly annealed to the right temper for flaring. Priced and sold in 50 foot coils. Please order by the coil.

50 Foot Coils

No.	OD Size	Wall Thick	Approx. Wt.	Per Coil	10 Lot Per Coil
8127	1/8"	.030"	1.74 lbs.	$11.02	$10.46
8110	3/16"	.030"	2.88 lbs.	11.84	11.24
8111R	1/4"	.030"	4.02 lbs.	14.44	13.72
8112R	5/16"	.032"	5.45 lbs.	18.50	17.56
8113R	3/8"	.032"	6.70 lbs.	21.30	20.22
8115R	1/2"	.032"	9.10 lbs.	27.20	25.82
8156R	5/8"	.035"	12.55 lbs.	36.54	34.68
8157R	3/4"	.035"	15.20 lbs.	42.62	40.46
8159R	7/8"	.045"	22.75 lbs.	63.00	59.82
8160R	1-1/8"	.050"	32.75 lbs.	92.82	88.12
8162R	1-3/8"	.055"	44.20 lbs.	127.70	121.22

Comparison

OD Size	Nominal Pipe Size
3/8"	1/4"
1/2"	3/8"
5/8"	1/2"
3/4"	—
7/8"	3/4"
1-1/8"	1"

Hard Copper Refrigeration Tubing

Hard copper tubing in the approved types for refrigeration, plumbing, and heating lines. This tubing is made to A.S.T.M. and Federal Government specifications. We allow the lot length price on orders for assorted sizes 200 foot lots. Because some express and transportation companies charge a premium on shipments of 20 ft. lengths, we suggest purchases in 10 ft. lengths where possible.

Type "K" Tubing

Heavy duty tubing for refrigeration and general plumbing and heating use. Also for underground use.

OD Size Shown

10 Ft. Long No.	20 Ft. Long No.	O.D.	Wall Thick	Wt. Per Ft. Lb.	Per Foot	200 Ft. Lots Per Ft.
7000A	7000C	⅜"	.035	.145	$ .52	$ .50
7001A	7001C	½"	.049	.269	.82	.80
7002A	7002C	⅝"	.049	.344	1.00	.96
7003A	7003C	¾"	.049	.418	1.32	1.28
7004A	7004C	⅞"	.065	.641	1.78	1.72
7005A	7005C	1⅛"	.065	.839	2.38	2.30
7006A	7006C	1⅜"	.065	1.04	3.02	2.90
7007A	7007C	1⅝"	.072	1.36	3.84	3.70
7008A	7008C	2⅛"	.083	2.06	5.94	5.72
7009A	7009C	2⅝"	.095	2.93	8.62	8.30
7010A	7010C	3⅛"	.109	4.00	11.42	10.98
7012A	7012C	4⅛"	.134	6.51	19.50	18.78

"L"-Type A.C.R. Tubing

Used for interior plumbing and heating.

7021A	7021C	½"	.035	.198	$ .82	$ .60
7022A	7022C	⅝"	.040	.285	.82	.78
7023A	7023C	¾"	.042	.362	1.12	1.08
7024A	7024C	⅞"	.045	.465	1.30	1.24
7025A	7025C	1⅛"	.050	.655	1.88	1.82
7026A	7026C	1⅜"	.055	.884	2.50	2.40
7027A	7027C	1⅝"	.060	1.114	3.14	3.02
7028A	7028C	2⅛"	.070	1.75	4.90	4.72
7029A	7029C	2⅝"	.080	2.48	7.04	6.76

Type "M" Tubing

Light duty tubing for waste vents, water, drainage, etc.

7041A	7041C	½"	.025	.145	$ .44	$ .42
7042A	7042C	¾"	.028	.204	.56	.54
7044A	7044C	⅞"	.032	.328	.90	.86
7045A	7045C	1⅛"	.035	.465	1.32	1.26

PRICED AND SOLD BY THE FOOT BUT ONLY IN 20 FT. OR 10 FT. LENGTHS.

PLEASE ORDER BY THE FOOT AND USE THE STOCK NUMBER OF THE LENGTH YOU WANT

Solder Fittings

Uniform solder fittings with high tensile strength. They are highly resistant to corrosion and used with copper tubing they make perfect joints, as they have the same rate of expansion. All sizes listed are for the actual outside diameter of the tubing to be used. Iron pipe and iron pipe fittings are measured in nominal size which is 1/8" less than OD size shown. For comparison of nominal and OD sizes see the solder coupling listing.

Solder Coupling

Solder couplings with the same female solder connections at both ends to take copper tubing.

Sold Only in Package Lots As Shown

No.	For OD Tube	Nominal Pipe Size	Pkg. Quan.	Pkg. Lot Each Piece	Pkg. Lots Per 100 Each Piece
11400	1/8"	—	20	$ 1.14	$ 1.12
11402	3/16"	—	20	.14	.12
11407	1/4"	1/8"	20	.14	.12
11414	5/16"	—	20	.70	.64
6203	3/8"	1/4"	20	.14	.12
6206	1/2"	3/8"	20	.82	.88
6206	5/8"	1/2"	20	.22	.20
6207	3/4"	—	10	.70	.66
6208	7/8"	3/4"	10	.40	.38
6209	1-1/8"	1"	5	.96	.90
6200	1-3/8"	1-1/4"	5	1.64	1.48
6201	1-5/8"	1-1/2"	2	2.18	1.98
6202	2-1/8"	2"	1	3.16	2.88
11533	2-5/8"	2-1/2"	1	5.42	4.94
11534	3-1/8"	3"	1	9.62	9.00

Reducing Coupling

Solder couplings with different female solder connections at each end to take copper tubing.

Sold Only in Packages As Shown

No.	OD Tube	OD Tube	Pkg. Quan.	Pkg. Lot Each Piece	Pkg. Lots Per 100 Each Piece
11582	1/4"	3/16"	10	$ 1.34	$ 1.22
11583	5/16"	1/4"	10	.88	.82
11608	3/8"	1/4"	10	1.34	1.22
11584	3/8"	5/16"	10	1.34	1.22
11609	1/2"	1/4"	10	.72	.68
6210	1/2"	3/8"	10	.72	.68
6211	5/8"	3/8"	10	.82	.78
6212	5/8"	1/2"	10	.82	.78
6233	3/4"	3/8"	5	1.06	.98
6213	3/4"	1/2"	5		
6214	3/4"	5/8"	5		
6215	7/8"	1/2"	5	.76	.70
6216	7/8"	5/8"	5		
6234	7/8"	3/4"	5		
6217	1-1/8"	1/2"	5	1.62	1.48
6218	1-1/8"	5/8"	5		
6219	1-1/8"	7/8"	5		
6220	1-3/8"	5/8"	1	2.46	2.22
6221	1-3/8"	7/8"	1		
6222	1-3/8"	1-1/8"	1		
6224	1-5/8"	5/8"	1	3.10	2.82
6235	1-5/8"	7/8"	1		
6237	1-5/8"	1-1/8"	1		
6238	1-5/8"	1-3/8"	1		
6241	2-1/8"	5/8"	1	4.78	4.34
6242	2-1/8"	7/8"	1		
6244	2-1/8"	1-1/8"	1		
6245	2-1/8"	1-3/8"	1		
6246	2-1/8"	1-5/8"	1		
11538	2-5/8"	2-1/8"	1	9.68	9.08
11541	3-1/8"	2-1/8"	1	6.19	5.78
11542	3-1/8"	2-5/8"	1	12.76	11.96

Solder Tubing Caps

With female solder connection to cap copper tubing.

Sold Only in Packages As Shown

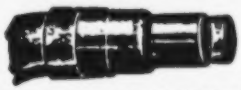
No.	OD Tubing	Pkg. Quan.	Pkg. Lot Each Piece	Pkg. Lots Per 100 Each Piece
11580	1/4"	20	$ .28	$ .24
11581	3/8"	20		
11582	1/2"	20	.40	.36
11583	5/8"	20	.18	.16
11584	3/4"	5	.44	.40
11585	7/8"	10	.32	.30
11586	1-1/8"	5	.84	.78
11587	1-3/8"	2	1.22	1.14
11588	1-5/8"	1	1.68	1.52
11589	2-1/8"	1	2.92	2.66

Suction Line P-Traps

These wrought copper P-Traps are installed at the bottom of the vertical suction line returning to the compressor. A small amount of oil seems to remain trapped in the P-Trap. But, in practice for some reason the P-Trap helps return the rest of the oil carried away by the refrigerant back to the compressor.

No.	Line	Wide	High	Each	Per 100 Each
11347	7/8" OD	7-9/16"	7-11/16"	$11.30	$10.58
11348	1-1/8" OD	8-3/8"	9"	15.34	14.34
11349	1-3/8" OD	11-3/4"	10-3/4"	22.78	21.30

Reducing Bushing



Reducing bushing with one end male to fit into a fitting and one end female to take copper tubing.

Sold Only in Package Lots As Shown

No.	Fitting	OD Tube	Pkg. Quan.	Pkg. Lot Each Piece	Pkg. Lots Per 100 Each Piece
11597	1/4"	1/8"	10	$ .50	$ .48
11446	3/8"	1/4"	10		
11449	1/2"	1/4"	10		
6920	1/2"	3/8"	10		
6921	5/8"	3/8"	10	.82	.78
6922	5/8"	1/2"	10		
6923	3/4"	3/8"	5	1.12	1.04
6924	3/4"	1/2"	5		
6926	3/4"	5/8"	5		
6926	7/8"	1/2"	5	.98	.92
6927	7/8"	5/8"	5		
6928	7/8"	3/4"	5		
6929	1-1/8"	1/2"	5	1.72	1.66
6930	1-1/8"	5/8"	5		
11549	1-1/8"	3/4"	5		
6931	1-1/8"	7/8"	5		
6932	1-3/8"	5/8"	2	2.06	1.98
6933	1-3/8"	7/8"	2		
6934	1-3/8"	1-1/8"	2		
6935	1-5/8"	5/8"	2	2.68	2.42
6936	1-5/8"	7/8"	2		
6937	1-5/8"	1-1/8"	2		
6938	1-5/8"	1-3/8"	2		
6939	2-1/8"	5/8"	1	4.84	4.42
6940	2-1/8"	7/8"	1		
6941	2-1/8"	1-1/8"	1		
6942	2-1/8"	1-3/8"	1		
6943	2-1/8"	1-5/8"	1		
11619	2-5/8"	1-3/8"	1	9.30	8.72
11621	2-5/8"	2-1/8"	1	9.30	8.72
11625	3-1/8"	2-1/8"	1	9.92	9.28
11626	3-1/8"	2-5/8"	1		

Solder Adapter To Male Pipe

With a male end to fit into solder fitting and the other end male pipe to connect a solder fitting to an iron pipe fitting.

Sold Only in Package Lots As Shown

No.	OD Tube	Male IPT	Pkg. Quan.	Pkg. Lot Each Piece	Pkg. Lots Per 100 Each Piece
11568	1/4"	1/8"	1	$2.96	$2.70
11569	3/8"	1/4"	1	2.96	2.70
11570	1/2"	3/8"	1	2.32	2.10
11571	1/2"	1/2"	1	2.58	2.34
11572	5/8"	3/8"	1	2.50	2.28
11573	5/8"	1/2"	1	2.50	2.28
11574	7/8"	3/4"	1	3.18	2.90
11575	1-1/8"	1"	1	4.02	3.66

45° Solder Elbows

Female copper to copper solder elbows at a 45° angle to take copper tubing.

Sold Only in Package Lots As Shown

No.	OD Tubing	Pkg. Quan.	Pkg. Lot Each Piece	Pkg. Lots Per 100 Each Piece
11411	3/8"	5	$1.62	$1.46
11412	1/2"	5	1.34	1.22
11413	5/8"	10	.52	.46
11414	3/4"	2	2.48	2.26
11415	7/8"	5	.84	.78
11416	1-1/8"	2	2.18	1.98
11417	1-3/8"	2	2.92	2.68
11418	1-5/8"	1	3.54	3.22
11419	2-1/8"	1	6.66	6.16
11529	2-5/8"	1	11.54	10.80
11530	3-1/8"	1	17.00	15.92

ALL SOLDER FITTINGS CAN BE ASSORTED IN PKG. LOTS FOR 100 LOT PRICES

Solder Elbows

Female copper to female copper solder elbows for joining two copper tubes where a 90° bend is necessary.

Sold Only in Package Lots As Shown

90° Short Radius

No.	OD Tubing	Pkg. Quan.	Pkg. Lot Each Piece	Pkg. Lots Per 100 Each Piece
6223	3/8"	5	$ 1.18	$ 1.06
6225	1/2"	5	1.20	1.12
6226	5/8"	20	.24	.22
6227	3/4"	5	1.68	1.50
6228	7/8"	5	.86	.82
6229	1-1/8"	5	1.30	1.20
6248	1-3/8"	2	2.50	2.28
6249	1-5/8"	1	3.08	2.80
6250	2-1/8"	1	5.56	5.10
11595	2-5/8"	1	11.08	10.36
11596	3-1/8"	1	15.42	14.42
11331	4-1/8"	1	30.14	28.58

90° Standard Radius

No.	OD Tubing	Pkg. Quan.	Pkg. Lot Each Piece	Pkg. Lots Per 100 Each Piece
11380	3/16"	5	$ 1.44	$1.32
11550	1/4"	5	1.44	1.32
11381	5/16"	5	1.50	1.38
11551	3/8"	5	1.44	1.32
11552	1/2"	5	1.74	1.58
11553	5/8"	5	1.84	1.68
11554	3/4"	2	1.98	1.80
11555	7/8"	2	2.48	2.26
11556	1-1/8"	1	3.54	3.24
11557	1-3/8"	1	5.42	4.94
11558	1-5/8"	1	9.56	8.78
11559	2-1/8"	1	11.30	10.58
11560	2-5/8"	1	21.18	19.82
11561	3-1/8"	1	29.84	28.26

Reduction Elbow

Same as above, but with one end smaller

No.	OD to OD		Pkg. Quan.	Pkg. Lot Each Piece	Pkg. Lots Per 100 Each Piece
11607	3/8"	1/4"	5	$3.70	$3.36
6230	1/2"	3/8"	5	1.34	1.22
6231	5/8"	3/8"	5	2.26	2.06
6232	5/8"	1/2"	5	2.26	2.06
6236	7/8"	5/8"	5	1.54	1.38
6262	1-1/8"	5/8"	1	2.38	2.16
6239	1-1/8"	7/8"	1	2.38	2.16
6268	1-5/8"	1-1/8"	1	9.20	8.62
11598	1-5/8"	1-3/8"	1	8.92	8.36

Return Bends

Wrought copper return bends with copper to copper solder connections to take copper tubing.

Sold Only in Package Lots As Shown

No.	OD Tube	Centers	Pkg. Quan.	Pkg. Lot Each Piece	Pkg. Lots Per 100 Each Piece
11397	3/8"	1-1/2"	5	$1.22	$1.14
11471	1/2"	1-1/2"	5	1.40	1.28
11477	5/8"	2"	2	2.62	2.38
11398	5/8"	2-1/2"	2	3.02	2.76
11399	3/4"	2"	1	5.10	4.66
11482	3/4"	2-1/4"	1	4.42	4.04
11396	7/8"	2-1/2"	1	4.28	3.90

Street Elbow

A 90° elbow with one end male to fit into a solder fitting and other end female to take copper tubing.

Sold Only in Package Lots As Shown

90° Short Radius

No.	OD Tubing	Pkg. Quan.	Pkg. Lot Each Piece	Pkg. Lots Per 100 Each Piece
11451	1/2"	5	$ 1.50	$1.38
11452	5/8"	10	.40	.36
11567	7/8"	5	.72	.68
11591	1-1/8"	2	2.26	2.06
11592	1-3/8"	1	3.44	3.14
11593	1-5/8"	1	4.40	4.00
11594	2-1/8"	1	9.00	8.42

90° Standard Radius

No.	OD Tubing	Pkg. Quan.	Pkg. Lot Each Piece	Pkg. Lots Per 100 Each Piece
11450	3/8"	5	1.62	1.36
11590	5/8"	5	2.66	2.42
11453	3/4"	2	2.76	2.52
11454	7/8"	2	3.16	2.88
11455	1-1/8"	1	4.50	4.10
11456	1-3/8"	1	6.46	5.92
11457	1-5/8"	1	8.46	7.92
11458	2-1/8"	1	13.92	13.04
11531	2-5/8"	1	22.02	20.60
11532	3-1/8"	1	32.08	30.40

B. Tools and Equipment

Project BEST

VESL COMPETENCY B5 : Describe function and usage of work related equipment and tools.

GRAMMATICAL / LANGUAGE FORMS: For + gerund (phrase), Why question-pres. Do, infinitive phrase

LANGUAGE SAMPLES:

Instructor: What is a tube cutter used for? (vacuum pump)

Student: It's used for cutting tubing. (evacuating the system).

Instructor: Why do we use swaging tools?

Student: We use swaging tools to enlarge the openings of tubes.

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES: Using flashcards of tools, students ask each other what a particular tool is used for or why we use a particular tool.

RESOURCES: Mordern Refrigeration and Air Conditioning- p.39-71

C. Requesting Information

Project BEST

VESL COMPETENCY C1 : Indicate shortage of supplies.

GRAMMATICAL / LANGUAGE FORMS: "Be/Run + out of", Indefinite pronoun/adj-Any, How much/many + pres. Do

LANGUAGE SAMPLES:

Worker 1 : I'm out of screws. Do you have any?
Worker 2 : Sure. How many do you need?
Worker 1 : Just a couple.

Worker 1 : I ran out of refrigerant. Do we have any more?
Worker 2 : Sure. How much do you need?
Worker 1 : About ten ounces.

RELATED LANGUAGE ITEMS: Count/Non-count nouns
Units of measurement and their abbreviations- oz., lbs.,

SUGGESTED ACTIVITIES: Substitution Drill- Teacher states: I am out of _____.
Student responds: How much/many do you need?

RESOURCES: Speaking Up at Work- p.100-101

C. Requesting Informating

Project BEST

VESL COMPETENCY C2 : State need to replace defective part.

GRAMMATICAL / LANGUAGE FORMS: another, replacive "one" -singular and plural, object pronoun-them, Future-will

LANGUAGE SAMPLES:

Worker: I need another gauge manifold. This one is broken.

Supervisor: There's another one in the back room.

Worker: I have to get some gaskets. The ones on the compressor are broken.

Worker: I'll get them for you.

RELATED LANGUAGE ITEMS: Indirect requests in statement form.

SUGGESTED ACTIVITIES: Using flashcards of tools and supplies, students practice indicating that item is defective. Also practice with plural.

RESOURCES: Speaking Up at Work- p.101-103

C. Requesting Information

Project BEST

VESL COMPETENCY C3 : Borrow tools or equipment.

GRAMMATICAL / LANGUAGE FORMS: Possessive adjectives/pronouns, modal-can, Irregular verb-past tense

LANGUAGE SAMPLES:

Worker 1 : Can I borrow your tube cutter? The wheel broke on mine. (or I can't find mine.)

Worker 2 : Sure. Here you are.

RELATED LANGUAGE ITEMS: Formal vs. Informal ways of asking to borrow- "Give me your tube cutter once."

How to say no to someone who wants to borrow something from you.

SUGGESTED ACTIVITIES: With flashcards or actual objects, students practice borrowing tools and equipment giving reason for their need to borrow.

RESOURCES: Speaking Up at Work- p.98-99

C. Requesting Information

Project BEST

VESL COMPETENCY C4 : State problem and ask for assistance from co-worker, instructor, or supervisor.

GRAMMATICAL / LANGUAGE FORMS: Modal-can, Idiom- "to give someone a hand", Reflexive pronouns

LANGUAGE SAMPLES:

Worker 1 : Can you give me a hand?
Worker 2 : Sure. What do you need help with?
Worker 1 : I need help lifting this air conditioner.
(carrying)
(fixing.)
I can't do it (by) myself.

RELATED LANGUAGE ITEMS: What to say if you can't help immediately.

SUGGESTED ACTIVITIES: Substitution drill- using reflexive pronouns

RESOURCES: Speaking Up at Work- p.43-47

Dialog A

S= supervisor
W= worker

S: John, could I talk _____?

W: Sure. _____ ?

S: John, I really have my hands _____. Could you _____ me late tonight?

W: How _____ do you _____?

S: _____ two more hours.

W: That's fine. I _____.

S: Great. By _____, don't forget to check the new schedule.

W: I _____.

S: Thanks for _____ late, John.

W: No _____.

Dialog B

II. Fill in the blanks with an appropriate word(s).

A. _____me. Could you_____me, please?

B. _____ . What's the_____?

A. I don't know_____ attach these hoses to the system.

B. Here. _____ me show you.

A. I still don't _____. Can you _____me again.

B. No problem.

A. Okay. I_____. Thanks.

C. Requesting Information

Project BEST

VESL COMPETENCY C5 : Request supervisor/trainer to check work.

GRAMMATICAL / LANGUAGE FORMS: Modal- would, How question-Pres.Be, forget + infinitive

LANGUAGE SAMPLES:

Worker: Would you check this for me, please?

Supervisor: Looks good.

Worker: How's this so far?

Trainer: Good, but don't forget to plug all the openings.

RELATED LANGUAGE ITEMS: Polite requests

SUGGESTED ACTIVITIES: Dialogues- Have a checklist of items not to forget.

Student A: How's this so far?

Student B: Good, but don't forget to _____.

RESOURCES: Speaking Up at Work- p.83-84

D. Giving and Receiving Information

Project BEST

VESL COMPETENCY D1 : Describe heating and refrigeration/air conditioning work related procedures.

GRAMMATICAL / LANGUAGE FORMS: Sequencing words (first, then, after), have to

LANGUAGE SAMPLES:

Student: What do I have to do after cutting the tubing?

Instructor: First, you have to remove the burr with a reamer. Then you have to clean the outside of the tube with sandpaper.

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES: Using lists of various procedures, students practice telling each other the procedures using sequencing words and before and after.

RESOURCES: Speaking Up at Work- p.127-128

D. Giving and Receiving Information

Project BEST

VESL COMPETENCY D2 : Report on progress of a specific task.

GRAMMATICAL / LANGUAGE FORMS: Be + done/finished, Adverb-yet, Have to

LANGUAGE SAMPLES:

Supervisor: Aren't you finished yet?

Worker: No, I'm not quite done. I have to check the pressure.

RELATED LANGUAGE ITEMS: Discuss difference between a positive and negative question.

SUGGESTED ACTIVITIES:

RESOURCES:

D. Giving and Receiving Information

Project BEST

VESL COMPETENCY D3 : Report on procedure completed.

GRAMMATICAL / LANGUAGE FORMS: Be + done/finished + gerund

LANGUAGE SAMPLES:

Student: I'm done cleaning and fluxing the joint.

Instructor: Good. Now solder it.

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES: Substitution drill.

RESOURCES:

D. Giving and Receiving Information

Project BEST

VESL COMPETENCY D4 : Respond appropriately to positive and negative feedback.

GRAMMATICAL / LANGUAGE FORMS: Indefinite adjective-another, replacive "one"
Intensifier-too

LANGUAGE SAMPLES:

Supervisor:	You did a good job fixing that air conditioner.
Worker	Thanks a lot.
Instructor:	You used too much solder on that joint.
Student:	I see that now. Should I try doing another one?
Instructor:	That's a good idea.

RELATED LANGUAGE ITEMS:

Responding appropriately to criticism.

SUGGESTED ACTIVITIES:

Exercise distinguishing between another, others, the other, etc.

RESOURCES: Speaking Up at Work- p.83-84

Project BEST

I. Fill in the blanks with a correct form of "other."

1. There's a book on the sofa. There's _____one on the couch.
2. I have two problems. One problem is that I don't have any money. _____problem is that I don't have a job.
3. Some people are friendly, but_____are not.
4. Mary and I see_____once in a while.
5. John has two sisters. One is 15 and _____is 12.
6. I have a whole bag of candy. Here's a piece for you. Would you like_____piece?
7. There are three kinds of food I like. One is Thai. _____ is Arabic. _____is French.
8. I invited 25 people to my party. Eighteen people can come;_____ can't.
9. I will probably work for this company for_____two years.
10. Please number your paper from one to ten. Do not write on every line. Please write on_____line.

D. Giving and Receiving Information

Project BEST

VESL COMPETENCY D5 : Offer explanation or apology for incomplete or unsatisfactory work.

GRAMMATICAL / LANGUAGE FORMS: Perfect Modal-should (not) have + past participle, simple past-negative

LANGUAGE SAMPLES:

Supervisor:	You should have adjusted the gauge to 0.
Worker:	I'm sorry. I didn't know. I'll do it again.
Supervisor:	You should not have set the needle when the gauge was connected.
Worker:	I'm sorry. I didn't know. I'll do it again right now.

RELATED LANGUAGE ITEMS: Attitude

SUGGESTED ACTIVITIES: Ask students what they should have done but didn't do in the past week.

RESOURCES:

D. Giving and Receiving Information

Project BEST

VESL COMPETENCY D6 : Respond to inquiry by giving an oral diagnosis of mechanical problem or malfunction.

GRAMMATICAL / LANGUAGE FORMS: Gerund- as object of sentence, because
Past tense- question-Do, Be + past participle

LANGUAGE SAMPLES:

Instructor:	Why did the unit stop running?
Student:	(It stopped running) because the overload (protector) was broken.
Customer:	Why does the freezer ice up like that?
Worker:	The thermostat is broken.

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES: Students are given a list of problems and possible causes. They ask each other questions. (see troubleshooting chart)

RESOURCES: Modern Refrigeration and Air Conditioning- p.342-343

BEST lab

TROUBLESHOOTING CHART

TROUBLE	COMMON CAUSE	REMEDY
1. Unit will not run.	Blown fuse.	Replace fuse
	Low voltage.	Check outlet with voltmeter, should check 115V plus or minus 10 percent.
		If circuit overloaded, either reduce load or have electrician install separate circuit.
		If unable to remedy any other way, install auto transformer.
	Broken motor or temperature control.	Jumper across terminals of control. If unit runs and connections are all tight, replace control.
	Broken relay.	Check relay, replace if necessary.
	Broken overload.	Check overload, replace if necessary.
	Broken compressor.	Check compressor, replace if necessary.
	Defective service cord.	Check with test light at unit, if no circuit and current is indicated at outlet, replace or repair.
	Broken lead to compressors, timer or cold control.	Repair or replace broken leads.
	Broken timer.	Check with test light and replace if necessary.
2. Refrigerator section too warm.	Repeated door openings.	Instruct user.
	Overloading of shelves, blocking normal air circulation in cabinet.	Instruct user.
	Warm or hot foods placed in cabinet.	Instruct user to allow foods to cool to room temperature before placing in cabinet.
	Poor door seal.	Level cabinet, adjust door seal.
	Interior light stays on.	Check light switch; if faulty, replace.
	Refrigerator section airflow control.	Turn control knob to colder position. Check airflow heater.
		Check if damper is opening by removing grille. With door open, damper should open. If control inoperative, replace control.
	Cold control knob set at too warm a position, not allowing unit to operate often enough.	Turn knob to colder position.
	Freezer section grille not properly positioned.	Reposition grille.
	Freezer fan not running properly.	Replace fan, fan switch, or defective wiring.
	Defective intake valve.	Replace motor compressor.
	Air duct seal not properly sealed or positioned.	Check and reseal or put in correct position.
3. Refrigerator section too cold.	Refrigerator section airflow control knob turned to coldest position.	Turn control knob to warmer position.
	Airflow control remains open.	Remove obstruction.
	Broken airflow control.	Replace control.
	Broken airflow heater.	Replace heater.
4. Freezer section and refrigerator section too warm.	Fan motor not running.	Check and replace fan motor if necessary.
	Cold control set too warm or broken.	Check and replace if necessary.
	Finned evaporator blocked with ice.	Check defrost heater thermostat or timer. Either one of these could cause this condition.
	Shortage of refrigerant.	Check for leak, repair, evacuate and recharge system.
	Not enough air circulation around cabinet.	Relocate cabinet or provide clearances to allow sufficient circulation.
	Dirty condenser or obstructed condenser ducts.	Clean the condenser and the ducts.
	Poor door seal.	Level cabinet, adjust door seal.
	Too many door openings.	Instruct customer.
5. Freezer section too cold.	Cold control knob improperly set.	Turn knob to warmer position.
	Cold control capillary not properly clamped to evaporator.	Tighten clamp or reposition.
	Broken cold control.	Check control. Replace if necessary.

TROUBLESHOOTING CHART

TROUBLE	COMMON CAUSE	REMEDY
6. Unit runs all the time.	Not enough air circulation around cabinet or air circulation is restricted.	Relocate cabinet or provide proper clearances around cabinet – remove restriction.
	Poor door seal.	Check and make necessary adjustments.
	Freezing large quantities of ice cubes, or heavy loading after shopping.	Explain to customer that heavy loading causes long running time.
	Refrigerant charge.	Undercharge or overcharge – check, evacuate and recharge with proper charge.
	Room temperature too warm.	Ventilate room as much as possible.
	Cold control.	Check control; if it allows unit to operate all the time, replace control.
	Defective light switch.	Check if light goes out. Replace switch if necessary.
	Excessive door openings.	Instruct customer.
7. Noisy operation.	Loose flooring or floor not firm.	Tighten flooring or brace floor.
	Tubing contacting cabinet or other tubing.	Move tubing.
	Cabinet not level.	Level cabinet.
	Drip tray vibrating.	Move tray – place on styrofoam pad if necessary.
	Fan hitting liner or mechanically grounding.	Move fan.
	Compressor mechanically grounded.	Replace compressor mounts.
8. Unit cycles on overload.	Broken relay.	Replace relay.
	Weak overload protector.	Replace overload protector.
	Low voltage.	Check outlet with voltmeter. Underload voltage should be 115V plus or minus 10 percent. Check for several appliances on same circuit or extremely long or undersized extension cord being used.
	Poor compressor.	Check with test cord and also for ground before replacing.
9. Stuck motor compressor.	Broken valve.	Replace motor compressor.
	Insufficient oil.	Add oil; if unit still will not operate, replace motor compressor.
	Overheated compressor.	If compressor faulty for any reason, replace motor compressor.
10. Frost or ice on finned evaporator.	Broken timer.	Check with test light and replace if necessary.
	Defective defrost heater.	Replace heater.
	Defective thermostat.	Replace thermostat.
11. Ice in drip catcher.	Defective drip catcher heater.	Replace heater.
12. Unit runs all the time, temperature normal.	Ice builds up on the evaporator.	Check door gaskets – replace if necessary.
	Control bulb on thermostat not in contact with evaporator surface.	Place control bulb in contact with the evaporator surface.
13. Freezer runs all the time. Temperature too cold.	Faulty thermostat.	Check thermostat – test and replace if necessary.
14. Freezer runs all the time. Temperature too warm.	Ice buildup in insulation.	Remove breaker strips, stop unit, melt ice and dry insulation, seal outer shell leaks and joints and then assemble.
15. Rapid ice buildup on the evaporator.	Leaky door gasket.	Adjust door hinges. Replace door gasket if cracked, brittle or worn.
16. Door on freezer compartment freezes shut.	Faulty electric gasket heater.	Use alternate gasket heater or install new one.
	Faulty gasket seal.	Inspect and check gasket. If worn, cracked or hardened, replace it.
17. Freezer works then warms up.	Moisture in refrigerator.	Install drier in liquid line.
18. Gradual reduction in freezing capacity.	Wax buildup in capillary tube.	Use capillary tube cleaning tool or replace capillary tube.

Fig. 11-13. Chart lists some common hermetic system troubles, their causes and suggested remedies.

BEST COPY AVAILABLE

E. Clarification

Project BEST

VESL COMPETENCY E1 : Express understanding or lack of understanding

GRAMMATICAL / LANGUAGE FORMS:
- Embedded "how" question
- "get it" idiom
- Short answer-Do

LANGUAGE SAMPLES:

Instructor:	Do you understand now how to install a filter drier?
Student:	No, I'm sorry. I don't (get it) (understand).
Instructor:	Do you (know)understand how you're supposed to start the furnace?
Student:	Yes, I do. I understand. (I know how to do it.)

RELATED LANGUAGE ITEMS:
- Importance of being honest when you don't understand.

SUGGESTED ACTIVITIES:
- Ask students what they know how to do.

RESOURCES:
- Speaking Up at Work- p.7-8

E. Clarification

Project BEST

VESL COMPETENCY E2 : Ask someone to repeat a word, phrase or set of instructions.

GRAMMATICAL / LANGUAGE FORMS:

- Modal-could
- Embedded WHAT question
- What question-past Do
- Reported Speech

LANGUAGE SAMPLES:

Worker:	Could you please repeat that? (what you said)?
Supervisor:	I said that you should take a break when you finish.
Worker:	Thanks. I will.

Supervisor:	Use the soap test.
Worker:	What did you say?

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES:

RESOURCES: Speaking Up at Work- p.6

E. Clarification

Project BEST

VESL COMPETENCY E3 : Ask someone to speak more slowly.

GRAMMATICAL / LANGUAGE FORMS: Modal-could

Comparative adverb-more

LANGUAGE SAMPLES:

Supervisor: Vacuum out the furnace.

Worker: Could you please speak more slowly?

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES:

RESOURCES: Speaking Up at Work- p.7

E. Clarification

Project BEST

VESL COMPETENCY E4 : Ask someone to pronounce or spell a word.

GRAMMATICAL / LANGUAGE FORMS: How question-Do

LANGUAGE SAMPLES:

Student: How do you spell that word?
(say)
(pronounce)

Instructor: Like this--calibrate
c-a-l-i-b-r-a-t-e

RELATED LANGUAGE ITEMS: Review names and pronounciations of letters of alphabet.

SUGGESTED ACTIVITIES: Students ask each other how to spell and pronounce their names.

RESOURCES: Speaking Up at Work- p.159

E. Clarfication

Project BEST

VESL COMPETENCY E5 : Request meaning of word, phrase, sentence, or abbreviation.

GRAMMATICAL / LANGUAGE FORMS:

What question-Do

Embedded WHAT statement

Stand for

LANGUAGE SAMPLES:

Student: What does this word mean?
(phrase)
(sentence)
Or I don't understand what this word means.

Instructor: It means _____.

Student: What does "BTU" stand for?
(this abbreviation)

Instructor: It stands for British Thermal Units.

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES:

Go over list of common abbreviations used in heating and air conditioning/refrig. Then have students practice asking each other meanings of abbreviations.

RESOURCES:

Modern Refrigeration and Air Conditioning- p.35

E. Clarification

Project BEST

VESL COMPETENCY E6 : Request name or function of an object or substance.

GRAMMATICAL / LANGUAGE FORMS:

What + Be passive

Used for (+ gerund)

How Question-Do

LANGUAGE SAMPLES:

Student: What's this called?
Instructor: That's the evaporator.

Student: What's this used for?
Instructor: That's used for bending tubing.

Student: How do you use this?
Instructor: You clamp it to the line.

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES:

Using diagrams and realia, students ask each other the above questions.

RESOURCES:

E. Clarification

Project BEST

VESL COMPETENCY E7 : Verify comprehension by repeating a word, phrase, or set of instructions.

GRAMMATICAL / LANGUAGE FORMS:

- Imperative
- Tag question-past tense

LANGUAGE SAMPLES:

Instructor: Use a Phillipsfor that job.
Student: A Phillips?
Instructor: Right.

Student: You said 1/4" tubing, didn't you?
Instructor: That's right. 1/4"

RELATED LANGUAGE ITEMS:

- Difference in meaning between positive and negative tag questions.

SUGGESTED ACTIVITIES:

RESOURCES:

VESL COMPETENCY : (See competencies in competency list under section F. On the following pages are samples of job-related reading material.)

GRAMMATICAL / LANGUAGE FORMS:

LANGUAGE SAMPLES:

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES:

RESOURCES:

Parts Catalogue

Tecumseh Model AE and AK Portable Room Air Conditioners Replacement Compressors

These compact and light room air conditioning compressors are excellent for replacement units because they are smaller and space should not be a problem. These compressors are sold without a base. They have a strap or loop that fits in any one of the bases listed below. The base is then firmly clamped through the loop. This gives you a variety of mountings for each compressor. They are priced without the bases. Bases must be bought separately. They are good replacements for Model AJ compressors. Compressors are sold less capacitors and relays but with overload. For a hard start kit use 21-25 Mfd. 250V start capacitor No. 48053 and resistor No. 48627. All Compressors except No. 62209L and 62211L need a 15 Mfd. 370V No. 49814 run capacitor with starting relay No. 39185. (Tecumseh No. 82785). Compressor No. 62209L and 62211L needs a 25 Mfd. 370V No. 49820 run capacitor. The full load Ampere and the BTU ratings are at the standard rating conditions of temperatures for 130° F. condensing, 45°F evaporating, 95°F ambient and 115°F liquid to expansion device. For use with F-22 refrigerant.

Fig. 8

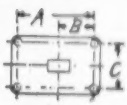
Fig. 9

60 CYCLE ONE PHASE For Use With F-22 Refrigerant With Overload But Without Relay, Capacitors and Base

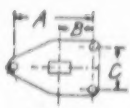
No.	Fig.	Tecumseh	HP	At Rated Conditions Full Load Volt	Amp	BTU	Torque	Suction Conn. OD	Suction Conn. ID	Discharge Conn. OD	Discharge Conn. ID	Displ.	Oil Charge Oz.	Wide	Long	High	Ship. Wt.	Each
62119L	8	AE5460E	½	115	7.0	6000	Normal		⅜		¼	.688	10	6⅛"	8¾"	9"	28 Lb.	$228.50
62164L	9	AK5470E	¾	115	7.1	7000	Normal	½	⅜	⅜	¼	.782	17	6⅜"	9⅜"	9½"	36 Lb.	264.00
62165L	9	AK5483E	¾	115	9.0	8300	Normal	½	⅜	⅜	¼	.954	17	6⅜"	9⅜"	9½"	36 Lb.	269.60
62166L	9	AK5483E	¾	230/208	4.4	8300	Normal	½	⅜	⅜	¼	.954	17	6⅜"	9⅜"	9½"	38 Lb.	268.60
62207L	9	AK5510E	1	115	10.5	10000	Normal	½	⅜	⅜	¼	1.134	17	6⅜"	9⅜"	9½"	38 Lb.	277.00
62208L	9	AK5510E	1	230/208	5.7	10000	Normal	½	⅜	⅜	¼	1.134	17	6⅜"	9⅜"	9½"	38 Lb.	280.50
62211L	9	AK5510E	1	265	5.0	10000	Normal	½	⅜	⅜	¼	1.134	17	6⅜"	9⅜"	9½"	38 Lb.	279.00
62209L	9	AK5511E	1	115	11.0	11000	Normal	½	⅜	⅜	¼	1.25	17	6⅜"	9⅜"	9½"	38 Lb.	282.50
62210L	9	AK5512E	1	230/208	6.8	12000	Normal	½	⅜	⅜	¼	1.36	17	6⅜"	9⅜"	9½"	38 Lb.	281.50
62212L	9	AK5512E	1	265	5.9	12000	Normal	½	⅜	⅜	¼	1.36	17	6⅜"	9⅜"	9½"	38 Lb.	280.00

Bases For Model AE and AK Compressors

The Model AE and Model AK replacement compressors are made with a strap or loop on the bottom that fits into the 1⁹⁄₁₆" by 2⁵⁄₁₆" oblong slot in these bases. The compressor is supplied with a ⅞" by 5" oblong spring that fits into this loop below the base to hold it firmly to any one of these mounting bases. The compressors are priced without bases. Bases must be bought separately. On all bases with 3 hole mountings the third hole is on a center line between the other 2 holes. Bases are dished to match the shape of the bottom of the compressors. We show the bolt hole mountings and the location of the slot for each base.



39801



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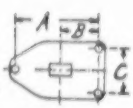

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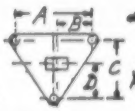

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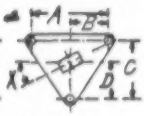


39806

No.	Tecumseh	Kit No.	A	B	C	D	Each
39801	28677	K698-1	8"	3¹¹⁄₁₆"	4¹⁵⁄₁₆"	2¹⁵⁄₁₆"	9.38
39802	28680	K698-3	8¼"	3½"	4½"	2¼"	
39803	28690	K698-6	8⅝"	4"	4¹⁵⁄₁₆"	2¹⁵⁄₁₆"	9.38

(No. 39806 Note the X indicates a 27° angle.)

No.	Tecumseh	Kit No.	A	B	C	D	Each
39804	28681	K698-2	8"	4¹⁵⁄₁₆"	6⅛"	3¹⁵⁄₁₆"	9.38
39805	28682	K698-4	8"	3¹¹⁄₁₆"	6⅛"	3¹⁵⁄₁₆"	
39806	28687	K698-5	8"	4"	6⅛"	3¹⁵⁄₁₆"	
39807		⅞" x 5"		mtg. spring			1.04

Tecumseh Hermetic Compressors For Air Conditioning and Heat Pumps

Normal Starting Torque Used With Capillary Tube Only
Higher Starting Torque Used With Expansion Valve Or Capillary Tube
All Compressors For F-22 Refrigerant And High Back Pressure A/C
All AJ Compressors Have 4¹³⁄₁₆" x [illegible] Mtg. Hold Centers
No Relays Or Capacitors Included
BTU Ratings At Standard Conditions

Fig. 3

Fig. 5

Fig. 7

60 Cycle Single Phase

No.	Fig.	Tecumseh	BTU	H.P.	Torque	Voltage	Connections Suction OD	Connections Suction ID	Connections Discharge OD	Connections Discharge ID	Displ.	Overall Inches Wide	Overall Inches Long	Overall Inches High	Oil Charge Oz.	Ship. Wt. Lbs.	Each
62233L	3	AJ5515F	15,000	1¼	Normal	230/208	—	½"	⅝"	⁹⁄₁₆"	1.580	6½	8⅝	10¹⁵⁄₁₆	26	52	$341.50
62234L	3	AJ5515F	15,000	1¼	Normal	265	—	½"	⅝"	⁹⁄₁₆"	1.595	6½	8⅝	10¹⁵⁄₁₆	26	52	354.50
62250L	3	AJ5517E	16,800	1½	Normal	230/208	—	½"	⅝"	⁹⁄₁₆"	1.830	6½	8⅝	11⅞	26	53	350.00
62276L	3	AJ5518E	18,500	1½	Normal	265	—	½"	⅝"	⁹⁄₁₆"	1.990	6½	8⅝	10²⁷⁄₃₂	26	53	373.00
62272L	3	AJ5519G	19,000	1¾	Normal	230/208	—	½"	⅝"	⁹⁄₁₆"	2.090	6½	8½	11⅞	26	53	379.00

(No. 633273L is Used On Self-contained Units)

All AH and AB Models For F-22 With 7½"x7½" Mtg. Hole Center—60 Cycle Single Phase
All AH Models Have Line Break Internal Overloads And Internal Relief Valves To By-pass High Pressure Over A 550 Lb. Differential

62274L	-	AB5519G	19,200	1¾	Normal	230/208	⅝"	⅝"	—	⅝"	2.227	8½	9	11⅝	32	60	$410.00
62296L	-	AB5524G	24,000	2	Normal	230/208	⅝"	⅝"		⅝"	2.722	8½	9	11⅝	32	62	433.00
62290L	5	AH5524E	24,000	2	Normal	230/208	⅝"	½"	—	⅝"	2.650	8⁹⁄₁₆	10⅛	13¼	45	79	481.00
62327L	5	AH5527E	27,100	2½	Normal	230/208	⅞"	⅝"	—	⅝"	2.990	8⁹⁄₁₆	10⅛	13	45	75	496.00
62329L	–	AB5528G	28,400	2½	Normal	230/208	⅝"	⅝"	—	⅝"	2.993	8½	9	13	32	64	453.00
62319L	—	AB5530G	30,000	2½	Normal	230/208	⅝"	⅝"	⅝"	⁹⁄₁₆"	3.117	8½	9	13	32	67	474.00
62328L	5	AH5531E	31,000	2½	Normal	230/208	⅝"	⅝"	½"	⅝"	3.450	8⁹⁄₁₆	10	14⅛	45	78	497.00
62337L	5	AH5540E	40,000	3	Normal	230/208	⅞"	⅞"	½"	⅝"	4.520	8⁹⁄₁₆	10	14¾	45	82	517.00
60 Cycle 3 Phase																	
62286L	5	AH5524E	24,000	2	Higher	240/208	⅝"	½"	—	⁹⁄₁₆"	2.650	8⁹⁄₁₆	10⅛	13¼	45	79	$587.00
62326L	5	AH5531E	31,000	2½	Higher	240/208	⅞"	⅝"	½"	⅝"	3.450	8⁹⁄₁₆	10	14⅛	45	76	604.00
62336L	5	AH5540E	40,000	3	Higher	240/208	⅞"	⅝"	½"	⅝"	4.520	8⁹⁄₁₆	10	14¾	45	82	604.00
62338L	5	AH5540E	40,000	3	Higher	460/440	⅞"	⅝"	½"	⅝"	4.520	8⁹⁄₁₆	10	14¾	45	82	627.00

All Model AG Compressors For F-22 Refrigerant High Back Pressure—60 Cycle Single Phase Mtg. Hole Centers 7½"x7½"

62362L	7	AG5546E	46,000	3½	Normal	230/208	1"	⅞"	—	½"	5.505	9	10½	16	65	99	$673.00
62385L	7	AG5553E	53,000	4	Normal	230/208	1"	⅞"	—	½"	6.148	9	10½	16	65	104	760.00
62414L	7	AG5561E	61,000	5	Normal	230/208	1"	⅞"	—	½"	6.866	9	10½	16	65	110	822.00
62430L	7	AG5568E	68,000	6	Normal	230/208	1"	⅞"	—	½"	7.591	9	10½	16	65	119	875.00
60 Cycle 3 Phase																	
62363L	7	AG5546E	46,000	3½	Higher	230/200	1"	⅞"	—	½"	5.505	9	10½	16	65	96	$757.00
62386L	7	AG5553E	53,000	4	Higher	230/200	1"	⅞"	—	½"	6.148	9	10½	16	65	96	794.00
62415L	7	AG5561E	61,000	5	Higher	230/200	1"	⅞"	—	½"	6.866	9	10½	16	65	101	848.00
62431L	7	AG5568E	68,000	6	Higher	230/200	1"	⅞"	—	½"	7.591	9	10½	16	65	107	897.00
62387L	7	AG5553F	53,000	4	Higher	460	1"	⅞"	—	½"	6.148	9	10½	16	65	96	811.00
62416L	7	AG5561F	61,000	5	Higher	460	1"	⅞"	—	½"	6.866	9	10½	16	65	101	864.00
62432L	7	AG5568F	68,000	6	Higher	460	1"	⅞"	—	½"	7.591	9	10½	16	65	107	902.00

DO NOT ATTEMPT TO OPERATE COMPRESSOR WITHOUT TERMINAL COVER IN PLACE.

•Any unit for closet installation requires two openings with each opening having one square inch free area per 1,000 BTUH total input of all appliances in the enclosure for combustion air and ventilation. Openings should be rectangular in shape (height equal to one-half width) and located 6 inches from the floor and the ceiling. For units with 100,000 BTUH or less input, a 100 square inch minimum free area of each opening is required.

TABLE 1 – CLEARANCES

TOP	1"
FRONT	6"
FLUE	6" see note 2
PLENUM	1"
BACK	1" see note 1
SIDES	1" (for 13.75" wide casing, 2") see note 2

Note 1: One (1) inch for Heat-Only applications.

For Heat-Cool (or "Add-On" cooling) applications of a companion coil, the cabinet will extend 4 inches beyond the furnace rear panel. An additional space of one (1) inch must be maintained between back wall of enclosure and the rear of the coil cabinet. See section under "DUCTWORK" for applicable "Standard" to be referenced.

Note 2: May be 1" when type B-1 vent is used.

COMBUSTION AIR AND VENTILATION

The furnace installation shall be such that the combustion air inlet openings (to the furnace) will be in the same atmospheric pressure zone as the draft hood relief opening of the furnace.

Provisions must be made for ventilation which is adequate to properly support combustion and to maintain safe ambient temperature.

When normal infiltration does not meet air requirements outside air must be introduced by means of inlet and outlet ducts. Minimum cross-sections of each duct must be one square inch of free area for each 2,000 BTUH total input of all appliances in the enclosure.

If a unit is installed where there is an exhaust fan, sufficient ventilation must be provided to prevent the exhuast fan from pulling a negative pressure in the room.

WARNING: The owner should be cautioned that the furnace area must not be used as a broom closet or for any other storage purposes because a fire or personal injury could result.

For more complete discussion of venting and of ventilation air requirements under various conditions, see American National Standard "National Fuel Gas Code" (Z223.1-1980), available from A.G.A. or from local gas companies.

VENTING

Unit must be vented through a good chimney or an approved vent. Check chimney for soot, leaks, obstruction and proper height to prevent down draft (see Fig. 1). If it is necessary to construct a new chimney, local conditions such as necessary height, draft and number of appliances served should be checked with gas company requirements and local building codes.

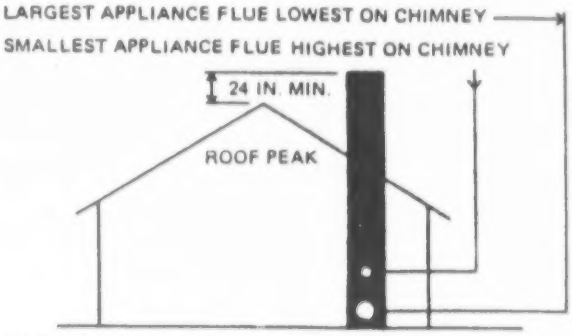


FIG. 1 – CHIMNEY VENTING

The horizontal connecting pipes should be as short as possible and should slope upward to the chimney (minimum rise 1/4" per horizontal foot, with no dips). Vent pipe should be the same inside diameter as that of connecting collar on draft hood. It is important that there be no blower or exhaust system that would pull a draft down the flue.

To secure flue pipe to drafthood outlet:

1. Place section of flue pipe on drafthood.
2. Remove the screws (2) that hold top panel in place at front corners of unit.
3. Then raise top up (approx. 3/4") to permit screws to be fastened through flue pipe into drafthood outlet flange.
4. Push top panel down in place and then refasten screws (2) to hold this panel to front corners of unit.

Where flue pipe must pass through a combustible wall, use a ventilated metal thimble 4 inches larger than the diameter of the flue pipe.

Where two or more appliances vent into a common flue, (see Fig. 2) effective area of common flue should at least equal area of largest flue or vent connector plus 50 percent of areas of additional flue or vent connectors (see Table 2). Flue or vent connector must be inserted into but not beyond inside wall of chimney flue liner.

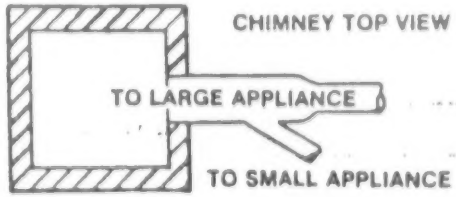


FIG. 2 – COMMON FLUE VENTING

G. Writing Skills

Project BEST

VESL COMPETENCY G1 : Write names of parts and services commonly used on invoices.

GRAMMATICAL / LANGUAGE FORMS:

LANGUAGE SAMPLES:

Words, expressions, and abbreviations commonly found on service reports/invoices, e.g., "routine check and maintenance", or "replaced thermostat", or "charged", etc.

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES: Practice filling out a sample service report and/or invoice.

RESOURCES:

PARTS ONLY — SHIP TO: CUSTOMER ☐ STORE ☐

DATE TAKEN	TAKEN BY	DATE PROMISED	DAY

SERVICE/PARTS ORDER

SEARS ROEBUCK AND CO.

1. CUSTOMER SERVICE COPY

UNIT NO	DAY	TELETYPE ORDER NO	SERVICE PARTS ORDER NO	CUSTOMER LAST NAME (FIRST FIVE CHARACTERS ONLY)	SERVICE: IN WARR	SERVICE: M.A.	SERVICE: COLL	PARTS: IN WARR	PARTS: M.A.	PARTS: COLL

MDSE. BIN TAG

REPAIR TAG NO.

STORE NO.

CUSTOMER NAME, ADDRESS, CITY AND ZIP CODE

GRID CODE ▶

CUSTOMER PHONE NO ▶

STORE ADDRESS

UNIT NO.	UNIT PHONE NO.	STATE, LOCAL REG. NO.

M.A. EXPIRATION DATE

CREDIT APPROVAL	CASH PRICE

SPECIAL INSTRUCTIONS ▶

SC/CLC	DC	MCA	CASH	SC/MCP		EP/MCP	ACCOUNT NO.	CREDIT INFO. TERMS	CREDIT INFO. C-LIFE	DEFER PMT. DATE	DELAYED SALES DATE

DIVISION	MERCHANDISE	RICHE INFO. CARD	RICHE INFO. ROW	RICHE INFO. COLUMN	RICHE INFO. DATE	MODEL NO.	SERIAL NO.	DATE DELIVERED

SERVICE REQUESTED ▶	PREV. TECH.	PREV. JOB CODE	PREVIOUS SERVICE

SERVICE REPORT

(1) CONDITION

(2) REPAIR

(3) DISPOSITION

ANTENNA: YES ☐ NO ☐

PRE-EDITED BY	TECHNICIAN'S SIGNATURE	POST-EDITED BY	M.A. APPROVAL	READINGS: TV-M/E	READINGS: MICROWAVE MW²

DIV	P/L NO.	PART NUMBER	DESCRIPTION	QUANTITY: ORD	QUANTITY: U/M	QUANTITY: I/T	QUANTITY: CONV	PRICE (EA.)	PARTS: IN WARRANTY	PARTS: MAINTENANCE AGREEMENT	PARTS: CHARGE CUSTOMER	SERVICE: JOB CHARGE	JOB CODE

TOTAL

TOTAL JOB CHARGE

LABOR BASIC CHARGE

DATE				
TRANSIT TIME				
MILES DRIVEN				
ARRIVE TIME				
DEPART TIME				
TECH. NO.				
CALL CODE				
CHARGE UNIT NO.				
PAYROLL TRANS CODE				

SENT MDSE. FOR REPAIR TO

DATE	FACTORY ORDER CUST NOTIFIED	REMOVE TO/FROM S.O. NO

This purchase is made under my Discover Cardmember Agreement which is incorporated herein by reference and I authorize the Issuer to pay Sears. This sale is subject to the approval of the Discover Card Credit Department.

X DC
PURCHASED BY

This purchase is made under my SearsCharge Account Agreement or my SearsCharge Modernizing Credit Plan Account Agreement which is incorporated herein by reference. This sale is subject to the approval of the Credit Sales Department of Sears, Roebuck and Co.

X SC
PURCHASED BY

If this sale is on Easy Payment Modernizing Credit Plan (EP/MCP), use applicable contract form.

DIV	TAX
98	
11	
57-A	
192	
192 (NOT TAXABLE)	

TAX

SUB-TOTAL

TOTAL CHARGE

ORDER NO.	PUNCH UP / NOTIFICATION			
	SOURCE			
PART BIN NO.	CUST.			

☐ PARTS (CHECKED)

☐ MDSE. OUT BY DATE IN BY DATE

CUSTOMERS SIGNATURE

X

82

83

G. Writing Skills

Project BEST

VESL COMPETENCY G2 : Write brief job-related messages.

GRAMMATICAL / LANGUAGE FORMS: Indirect speech

LANGUAGE SAMPLES:

2:00 pm
8-6-87

Bill - Tom said you should call him as soon as you get in.

Larry

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES:

RESOURCES: Basic Writing Skills, Letters, and Consumer Complaints- p.43-47

H. Giving and Asking for Locations/Directions

Project BEST

VESL COMPETENCY H1 : Ask for location of desired or needed objects.

GRAMMATICAL / LANGUAGE FORMS: Where question-pres. Be
Embedded WHERE question, Prepositional phrases–location.

LANGUAGE SAMPLES:

Student 1: Where's the hacksaw?
Student 2: It's in the third drawer from the bottom.

Worker 1: Do you know where the vacuum pump is?
Worker 2: Yeah. It's in the truck on the right hand side.

RELATED LANGUAGE ITEMS:
Ordinals

SUGGESTED ACTIVITIES: Using pictures and realia, indicate location of objects. Also have students write down location of objects.

RESOURCES: Speaking Up- p.27-29

H. Giving and Asking for Locations/Directions

Project BEST

VESL COMPETENCY H2 : Explain location of object relative to other objects or storage facilities.

GRAMMATICAL / LANGUAGE FORMS: Present Perfect, Where question+did, Prepostional Phrases-location

LANGUAGE SAMPLES:

Worker 1: Have you seen the reamer?

Worker 2: Yeah. It's on the work table, next to the torch.

Worker 1: Where did you put the changing cylinder?

Worker 2: It's on the floor in front of the R-12 refrigerant cylinder.

RELATED LANGUAGE ITEMS: Difference between drawers, cabinets, shelves, cupboards

SUGGESTED ACTIVITIES: Using diagrams and realia, indicate location of object relative to each other.

RESOURCES:

H. Giving and Asking for Locations/Directions

Project BEST

VESL COMPETENCY H3 : Ask and give location of a certain place within a building.

GRAMMATICAL / LANGUAGE FORMS: Where question-pres. Be, Embedded WHERE question, Prepositional phrases-location

LANGUAGE SAMPLES:

Worker: Where's the furnace?

Customer: It's downstairs in the laundry room.

Student 1: Do you know where the personnel office is?

Student 2: Yeah. It's on the third floor, across from the elevators.

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES: Students formulate dialogs based on diagrams.

Students must ask strangers the location of places within a building.

RESOURCES: Speaking Up At Work- p.22-24

H. Giving and Asking for Locations/Directions

Project BEST

VESL COMPETENCY H4 : Explain location of residence or important buildings relative to city landmarks.

GRAMMATICAL / LANGUAGE FORMS: Where question-pres. Do

LANGUAGE SAMPLES:

Worker 1: Where does Mrs. Johnson live?

Worker 2: She lives on Main street, about half of a block south of the post office.

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES:

Students ask each other where they live
Looking at a map, students ask each other location of important buildings or landmarks
See map for competency 6.

RESOURCES:

Reading Signs, Directories, Schedules, etc.
p.31

H. Giving and Asking for Locations/Directions

Project BEST

VESL COMPETENCY H5 : Following oral instructions, locate places on map.

GRAMMATICAL / LANGUAGE FORMS: "Let me" + base form, Ordinals, Present tense

LANGUAGE SAMPLES:

Worker: Now let me repeat those directions. First, I go north on Western until Pratt. Then I turn right on Pratt until Clark. After that I make a right on Clark and McDonalds is right there.

Pedestrian: That's right.

Worker: Thanks.

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES: Use maps and locate places on it.

RESOURCES:

H. Giving and Asking for Locations/Directions

Project BEST

VESL COMPETENCY H6 : Request driving directions to a specific location; confirm understanding.

GRAMMATICAL / LANGUAGE FORMS: Present continuous, yes/no Question-pres. Do, Conditional clause-if, Simple Present

LANGUAGE SAMPLES:

Worker:	Excuse me. I'm trying to find Memorial Hospital. Do you know how I can get there?
Pedestrian:	Sure. Just keep going north on Main. When you come to Jefferson street, turn left. Go west for two blocks. You'll see the hospital on the southwest corner of Jefferson and Maple.
Worker:	Let me see if I got this straight. I go north on Main and go left on Jefferson until Maple.
Pedestrian:	That's right!
Worker:	Thanks a lot.

RELATED LANGUAGE ITEMS:

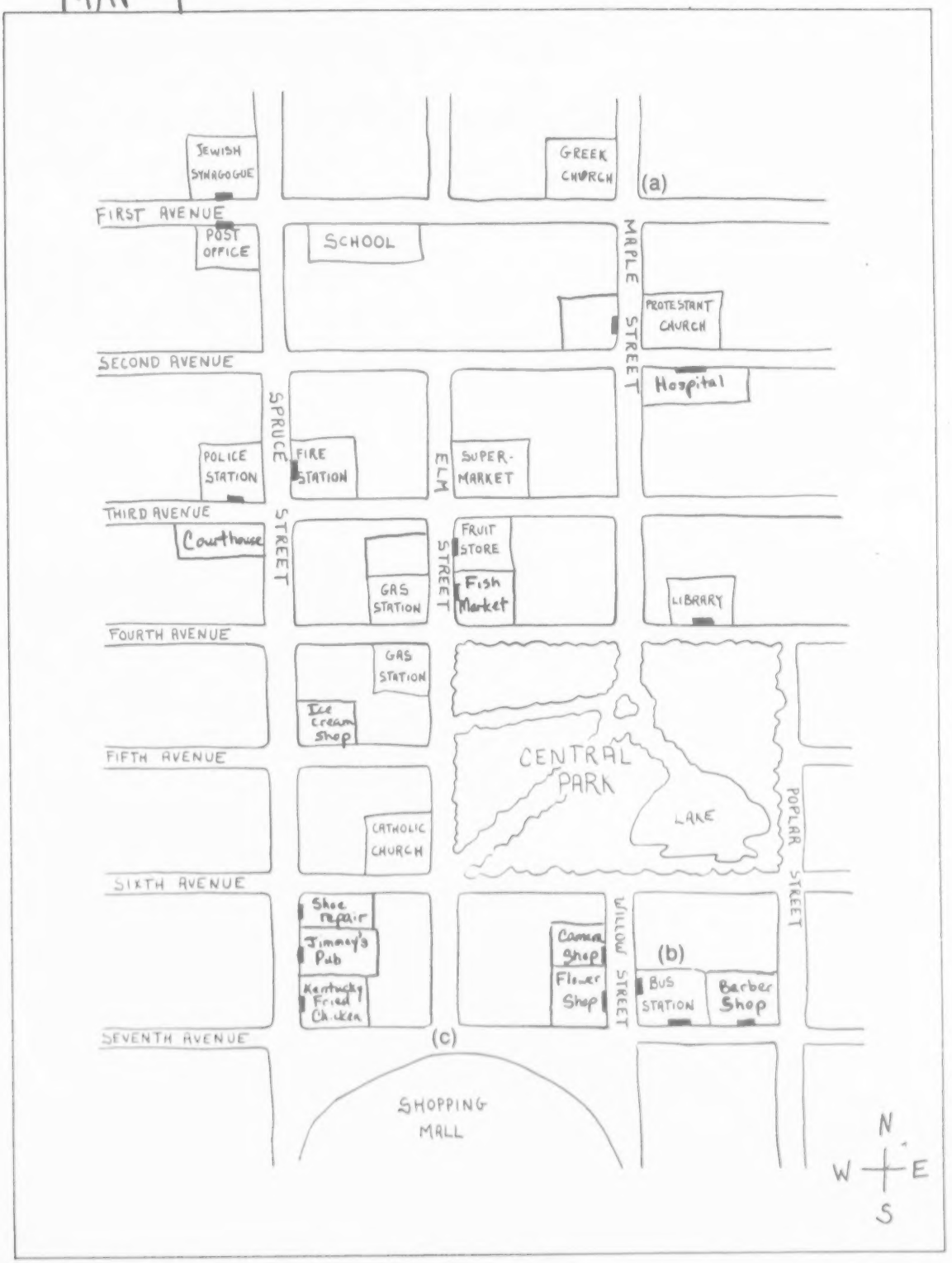
Importance of repeating directions.

SUGGESTED ACTIVITIES:

Using maps, students practice asking each other for driving directions. One map is incomplete. Student must follow directions.

RESOURCES:

MAP 1



Adapted from:
A Conversation Book : Book 1

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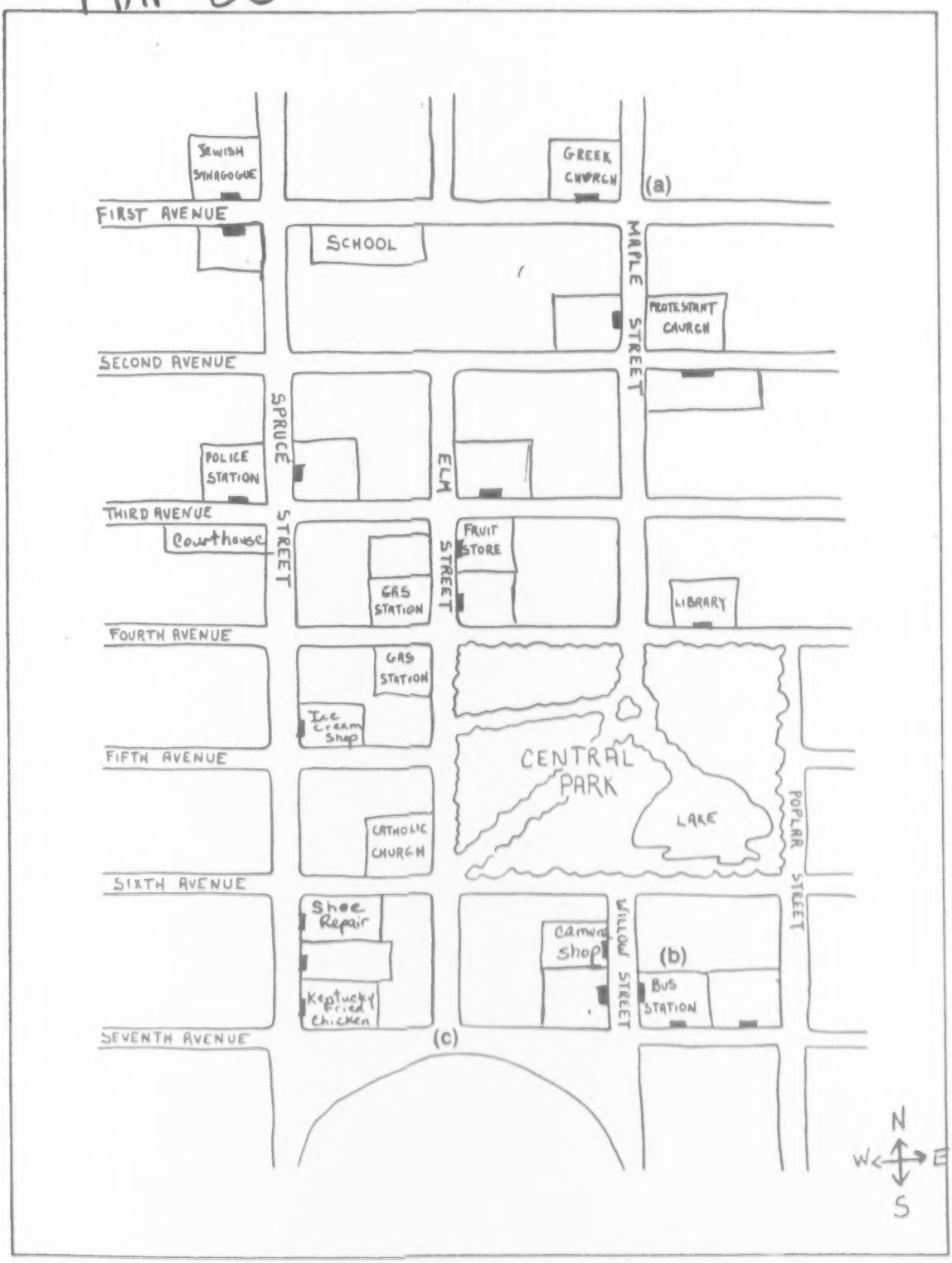
MAP 2


JEWISH SYNAGOGUE
GREEK CHURCH
(a)
FIRST AVENUE
SCHOOL
MAPLE STREET
PROTESTANT CHURCH
SECOND AVENUE
SPRUCE STREET
ELM STREET
POLICE STATION
THIRD AVENUE
Courthouse
FRUIT STORE
GAS STATION
LIBRARY
FOURTH AVENUE
GAS STATION
Ice Cream Shop
CENTRAL PARK
LAKE
POPLAR STREET
FIFTH AVENUE
CATHOLIC CHURCH
SIXTH AVENUE
Shoe Repair
Camera Shop
WILLOW STREET
(b)
BUS STATION
Kentucky Fried Chicken
SEVENTH AVENUE
(c)
N
W
E
S

106

Group 1

You are at point a. You ask someone walking past you for directions to:

1. the flower shop
2. the fish market
3. the shopping mall
4. the barber shop

Ask for clarification if you don't understand or if you're not sure you understand the directions. Repeat the directions back to the person. Thank the person for their help.

Group 2

You are at point b. You ask someone walking past you for directions to:

1. the supermarket
2. the hospital
3. the fire station
4. the post office

Ask for clarification if you don't understand or if you're not sure you understand the directions. Repeat the directions back to the person. Thank the person for their help.

H. Giving and Asking for Locations/Directions

Project BEST

VESL COMPETENCY H7 : Give driving directions to co-worker.

GRAMMATICAL / LANGUAGE FORMS: need + infinitive, Imperative, Modals-will/would

LANGUAGE SAMPLES:

Worker 1: I need to go to 1421 Chicago Ave. Do you know the best way to get there from here?

Worker 2: Sure. Go three blocks north until Broadway. Make a right and keep going east until Sherman, about two miles. You'll run right into Chicago Ave. 1421 would be just north of that intersection.

Worker 1: Thanks a lot.

RELATED LANGUAGE ITEMS:

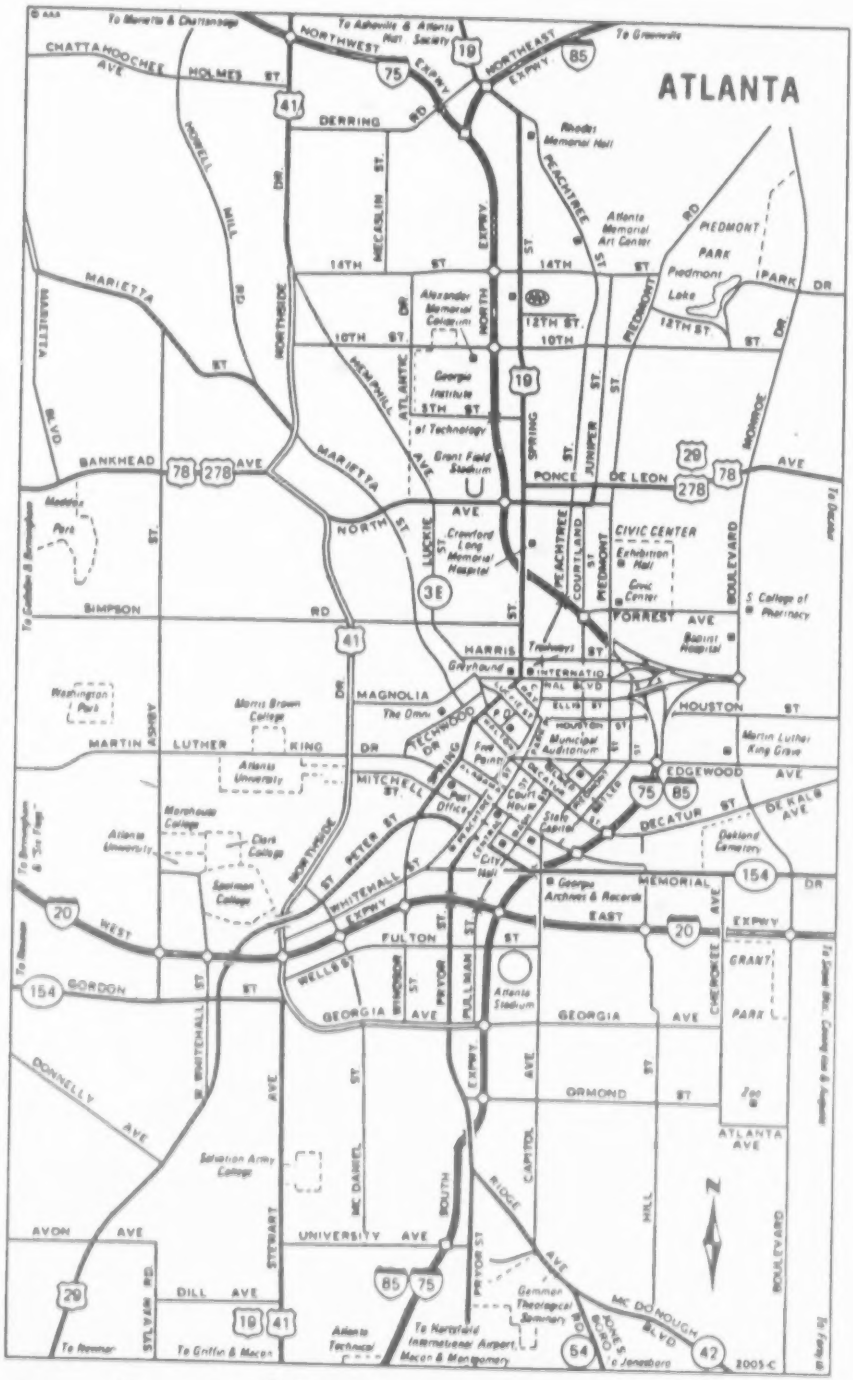
SUGGESTED ACTIVITIES:

RESOURCES:

Activity 5

Using street maps

Look over this map of Atlanta, Georgia. Then answer the questions on the next page.



1. List the interstate highways in and around Atlanta_____

2. Is Interstate 20 a north/south highway or an east/west highway in this portion of Atlanta?_____

3. Locate University Avenue near the bottom of the map. Take University Avenue to I-75, 85 and turn north. Travel I-75, 85 north until you come to Edgewood Avenue. Exit and turn west on Edgewood. Travel on Edgewood past Botler Street and to the corner of Piedmont Street and Edgewood Avenue.

   What public place are you near?_____

4. Locate Chattahoochee Avenue in the upper left portion of the map. Travel east on Chattahoochee Avenue to Howell Mill Road and turn right. Take Howell Mill Road to Marietta Street and travel southeast until it runs into Northside Drive. Take Northside Drive south to Martin Luther King Drive

   and turn left. Name the educational institution on your right_____

   On your left_____

5. Describe the simplest route from Maddox Park (mid-left side of the map) to Morris Brown

   College_____

   _____

   _____

   _____

6. Locate Atlanta University along Martin Luther King Drive west. List four colleges that are near Atlanta University.

   _____

   _____

7. This map has a directional symbol. Which corner of the map contains this directional symbol?

   a. northwest corner ____

   b. southeast corner ____

   c. southwest corner ____

   d. northeast corner ____

8. Martin Luther King is buried in Atlanta. On this map his grave site is between which two east/west

   streets?_____

VESL COMPETENCY I1 : Introduce yourself and others.

GRAMMATICAL / LANGUAGE FORMS: Idioms-Mind if....? and go right ahead,
"Nice to meet you"

LANGUAGE SAMPLES:

Worker 1: Hi. Mind if I sit down here?
Worker 2: No. Go right ahead and sit down.
Worker 1: Thanks. My name is Jose Gonzalez. I just started working in maintenance.
Worker 2: Nice to meet you, Jose. My name is Paul, and this is my friend Luis.
Worker 1: Nice to meet you, Paul. (handshake) Nice meeting you, Luis. (handshake)

RELATED LANGUAGE ITEMS: Handshaking customs, order of introductions
Formal versus informal introductions.

SUGGESTED ACTIVITIES: Roleplaying

RESOURCES: Speaking Up at Work- p. 62,165-166

Developing Communicative Competence:
Interaction Activities- p.7

I. Socializing

Project BEST

VESL COMPETENCY I2 : Greet a customer, co-worker, supervisor.

GRAMMATICAL / LANGUAGE FORMS:
How are you (doing)?
I'm (doing) fine.

LANGUAGE SAMPLES:

Worker: Hello, Mrs. Sixel. How are you today?
Customer: I'm just fine, thanks. And you?
Worker: I'm doing fine. Now, what seems to be the problem with your refrigerator?

Worker 1: Hey, Bill. How're you doing?
Worker 2: Pretty good. And yourself?
Worker 1: I'm doing good, thanks.

RELATED LANGUAGE ITEMS:
Formal versus Informal Greetings, Titles

SUGGESTED ACTIVITIES:
Roleplay, Dialogs

RESOURCES:
Speaking Up at Work- p.1-3
Developing Communicative Competence:
Interaction Activities- p.2-3

DIALOGUE WITH A FRIEND

by Gail Saunders

Richard: Hi, Victor, how are you?

Victor: Okay Richard, how about you?

Richard: Not bad, but I really hate Mondays. Hey, did you happen to see the Cubs' game on T.V?

Victor: No, I had to go shopping with my wife and kids.

Richard: That's okay, you didn't miss much. They were lousy as usual. Say, do you want to get together after work?

Victor: That sounds fine. Let's meet at 5:30.

Richard: Okay.

I. Socializing

Project BEST

VESL COMPETENCY I3 : Respond appropriately to greetings, statements, and inquires from customers, co-workers, and supervisors.

GRAMMATICAL / LANGUAGE FORMS: Past tense- questions and statements

LANGUAGE SAMPLES:

Worker 1:	Morning, Tom. How are you?
Worker 2:	Not bad. And you?
Worker 1:	Pretty good. I had a nice weekend.
Worker 2:	What did you do?
Worker 1:	Not much actually. I just went to the beach and relaxed, but it was great. How was your weekend?
Worker 2:	I painted the garage. It wasn't exactly a wonderful weekend, but I did get the job done.
Worker 1:	Glad to hear that.

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES:

Dialogs

Roleplaying

RESOURCES:

Speaking Up at Work- p.120

I. Socializing

Project BEST

VESL COMPETENCY I4 : Hold a social conversation with a customer, co-worker, supervisor.

GRAMMATICAL / LANGUAGE FORMS: Congratulations! Past tense question, Wish statement-about past (past perfect)

LANGUAGE SAMPLES:

Supervisor:	Congratulations on the birth of your new daughter!
Worker:	Thanks. We're really happy.
Supervisor:	How are your wife and baby doing?
Worker:	They're doing just fine. Thanks.

Worker 1:	Did you see the Cubs game last night?
Worker 2:	Yeah, but I wish I hadn't. They were so bad.
Worker 1:	Well, nobody's perfect.

RELATED LANGUAGE ITEMS: How to congratulate (for which occasions) and also give condolences.

SUGGESTED ACTIVITIES: Dialogs, Roleplaying

RESOURCES: Speaking Up at Work- p.121, 166-168

I. Socializing

Project BEST

VESL COMPETENCY I5 : End a conversation, say good-bye.

GRAMMATICAL / LANGUAGE FORMS:

It was nice +_____ing you.
same here
see you(around)
would like
have + got to

LANGUAGE SAMPLES:

Worker 1: Well, my break's up. I've got to go. It was nice meeting you, Sam
(talking with you)
(seeing you again)

Worker 2: Same here. See you around.

Worker 1: Judy, I'd like to talk longer, but I've got to go. Maybe we can talk some more next week.

Worker 2: That'd be great. Have a good weekend.

Worker 1: Thanks. You too.

RELATED LANGUAGE ITEMS:

Polite ways of dismissing yourself

SUGGESTED ACTIVITIES:

Dialogs
Roleplaying

RESOURCES:

Developing Communicative Competence:
Interaction Activities- p. 5-6, 36-37
Speaking Up- p.167

J. Telephoning

Project BEST

VESL COMPETENCY J1 : Call in an emergency.

GRAMMATICAL / LANGUAGE FORMS: Imperative, Past Tense

LANGUAGE SAMPLES:

Operator: Emergency operator. Can I help you?

Worker: Yes, please send an ambulance immediately to 1411 Washington Ave. My co-worker got an electric shock and is unconscious.

Operator: It's on the way. Cover the victim with a blanket and don't move him. The ambulance will be there in a few minutes.

Worker: Thank you.

RELATED LANGUAGE ITEMS: Emergency numbers for poison control, ambulance, police, fire, etc.

Distinguish between emergency and non-emergency situations.

SUGGESTED ACTIVITIES:

Dialogs

RESOURCES:

J. Telephoning

Project BEST

VESL COMPETENCY J2 : Call in sick/late to job or class.

GRAMMATICAL / LANGUAGE FORMS: Present tense, Future-won't

LANGUAGE SAMPLES:

Supervisor:	Dave Allen speaking.
Worker :	Hello, Mr. Allen. This is Jim Williamson.
Supervisor:	Yes, Jim. What can I do for you?
Worker:	Mr. Allen, I have the flu. I won't be in today.
Supervisor:	Sorry to hear you're sick. Hope you feel better. Call me tomorrow if you won't be in.
Worker:	O.K. I will. Thanks Mr. Allen.

RELATED LANGUAGE ITEMS: Discuss which excuses are acceptable

SUGGESTED ACTIVITIES: Dialogs
Roleplaying

RESOURCES: Speaking Up at Work- p.15-19

J. Telephoning

Project BEST

VESL COMPETENCY J3 : Call to request information or assistance.

GRAMMATICAL / LANGUAGE FORMS: Present Perfect-informal (I've got), Idiom- to go dead, had better + base form

LANGUAGE SAMPLES:

Worker 1:	ABC Heating and Air Conditioning. Walter speaking.
Worker 2:	Hey, Steve. This is Andre's. I've got a problem here. The battery on my truck went dead. Can you come give me a jump?
worker 1:	Sure. Where are you?
Worker 2:	I'm at 2712 W. Cortland. I think we'd better exchange trucks in case it'd happen again.
Worker 1:	Good idea. See you in a few minutes.

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES: Dialogs
Roleplays

RESOURCES:

J. Telephoning

Project BEST

VESL COMPETENCY J4 : Call to set up an appointment.

GRAMMATICAL / LANGUAGE FORMS: Would like + infinitive, Yes/No question-
Pres. Do
Modal-will

LANGUAGE SAMPLES:

Receptionist: Family Health Clinic.
Worker: Hello. This is Andy Krawczyk. I hurt my back at work and I'd like to make an appointment to Dr. Walters.
Receptionist: I see. When is a good time for you?
Worker: Do you have any openings for tomorrow morning?
Receptionist: We just had a cancellation. Would 10:00 be O.K?
Worker: 10:00am. That would be fine. I'll see you then. Thank you.

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES:

RESOURCES: Project Best-Employment Handbook

J. Telephoning

Project BEST

VESL COMPETENCY J5 : Call in to order parts.

GRAMMATICAL / LANGUAGE FORMS: need + infinitive, Modals-will, should

LANGUAGE SAMPLES:

Worker 1: Service Department. Bill speaking.

Worker 2: Hi, Bill. This is Andy. I need to order a compressor.

Worker 1: What kind?

Worker 2: I need a Tecumseh, model number AE 5460e, 6000 BTU.

Worker 1: O.K. I'll order that for you right away. We should have it by this afternoon.

Worker 2: Great. Thanks. I'll pick it up then.

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES: Dialogs

Roleplays

RESOURCES:

J. Telephoning

Project BEST

VESL COMPETENCY J6 : Take written telephone message.

GRAMMATICAL / LANGUAGE FORMS: Yes/No question-pres. Be, Indirect Speech

LANGUAGE SAMPLES:

Caller: Hello. This is Mary Chaplin. Is Steve Granger in?
Worker: No, I'm sorry. He isn't in yet. Can I take a message?
Caller: Yes, please tell him that Mary Chaplin called and that he can contact me at 583-3712 before 5:00pm.
Worker: O.K. Mary Chaplin -C-H-A-P-L-I-N?
Caller: Yes, that's right.
Worker: And the number was 583-3712?
Caller: Yes that's correct.
Worker: O.K. I'll give him the message as soon as he comes in.
Caller: Thank you.

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES:

Dialogs
Roleplays

RESOURCES:

Speaking Up at Work- p.159

ADVERTISING SALES REPS
Newspaper ad sales rep with experience wanted for a challenging position with a fast growing NW side newspaper. Call Mr. Boratyn, 772-3300

ADVERTISING SALES REP
For west suburban newspaper/shopper group. Must be experienced. For interview call 352-4300 ask for Mr. Guenther. EOE

ADVERTISING ART INTERN
Grad or student wanted for agency art duties. Paste-up, stats, etc. Great learning opportunity. 644-1414.

Advertising-Production Assistants & Copywriters See our ad under photography.
HR Studio, Inc.

ADVERTISING-PHONE SALES
Perm. position with Mich. Ave. firm estab. in 1943. Salary + good comm. 263-5388

ADVERTISING Phone Display space sales. Hard sell. Sports-frat. pubs. Local-L.D. 9-4:30, Mich Av. 372-1216

Advertising. See our ad under TYPESETTER
Hamilton, Carver & Lee

★★★★★★★★★★★★★★★★
Air Conditioning & Heating

SALESMAN

Leading heating & A/C company needs an experienced salesman to work in a top flight organization. Outstanding income and fantastic future. Apply in person.
American Home Htg Co. Inc.
5833 W. Irving Pk Rd.
Chicago, IL
736-5636
★★★★★★★★★★★★★★★★

AIR CONDITIONING SERVICE MANAGER

HINSDALE AREA
Commercial and industrial service contractor needs organized person to manage dept. of 6 service technicians. Must be able to manage busy dept., quote service jobs, supervise dispatcher. Field service experience helpful. Excellent salary and benefits. Resume to:
P.O. Box 803883, M4791
Chicago, IL 60680

AIR COND. & HEATING SERVICE TECHNICIAN

Due to our expansion we have immediate opening for qualified technician. Minimum 3 years experience necessary. Top pay, vacation, company truck. Full time year round employment. Skokie Valley Air Control Inc., 6310 Lincoln Ave., Morton Grove, IL. Call Mon.-Fri. 8 to 4, 679-1966 ask for Jeff Byron

AIR COND./HEATING
Salespeople earn $2000wk
Ideal applicant must have knowledge of residential furnace, hot water & air conditioning systems. Require good selling techniques without high pressure tactics.
HEATMASTERS
5540 W. Lawrence 777-5700

AIR CONDITIONING SERVICE

Residential & comm. divs. of #1 service co. on North Shore. Exc. pay, benefits, oppty to advance. Call Mr. Wayne.
NORTHERN WEATHERMAKERS
866-7000

AIR CONDITIONING

WANTED: qualified heating and a/c service people with 5 years experience. Year round work. Benefits include medical & dental insurance and two weeks paid vacation after one year. Call 259-5721.

AIR CONDITIONING
HVAC contractor seeking serviceman with minimum 3 yrs exp. Union shop. Company truck supplied. Call 429-7700.

Air condition/heating/sheet metal. SW sub contractor looking for exp mechanic and technicians (No limit $) 532-7500.

AIR CONDITIONING
Exp'd. min 2 yrs. service mechanic for resid. & comm. A/C company. 520-5700

AIR CONDITIONING
SERVICE & SALES
Apply 763-9224 for appt.

Air Conditioning & Heating Service Technician for Northern suburbs. Our 31 year old firm is seeking a top notch technician and installer for our residential and light commercial clients. Must have a minimum 5 yrs field experience and good customer relations skills. This is a permanent full time position for someone looking for a career, not just another job. Top salary, truck, vacation, benefits, etc.
729-0123

Air Conditioning & Heating Servicemen and installers. Residential and commercial. Year round work. Insurance and benefits. Minimum 5 years experience. Must have own tools. Starting pay up to $25.00/hr. Call Jack 421-4759

AIR CONDITIONING
EXP'D SERVICEMAN WANTED.
652-0650

AIR COND. & HEATING
Installer & Serviceman. Expd. only w/refs. apply. 847-7497

AIR CONDITIONING
Serviceman & Installer
Experienced only. 545-7387

AIR FREIGHT DELIVERY
Owner operator with van to work dock & drive. Unique commission arrangement and guarantee. Call Delores between 9 & 12pm. Call:
World Transport 439-6323

AIR FREIGHT SALES

Min. 3 yrs sales exp. in air export in Chgo area. Call 956-7106 betw 10am-1pm Mon, Wed, Fri only.

AIR FREIGHT-Customer Service
Experienced in air freight a must. Excellent company benefits and starting salary. Call after 3pm, ask for Jim Fattes or Bob Boyle, 364-4303

Health Clubs
MEMBERSHIP SALES
JOIN OUR TEAM of professionals inside and corporate sales, excellent compensation and benefits. Resumes to:
LSW- Four Flaggs Club,
8245 Golf Rd, Niles 60648

Heating & A/C
HVAC TECHNICIANS

Skokie manufacturer has openings for two qualified HVAC Technicians. 2 year HVAC Degree or equivalent experience and education required. Qualified applicants must have a basic understanding of refrigeration/air cond., good communication skills in the English language, experience in A/C troubleshooting, service and testing preferred. Competitive salary and benefit package with a leader in the water-cooled air conditioning market. Please call Mr. Forrest 679-0300 between 9am-Noon.

Heating & A/C
HVAC MECHANIC

Full-time permanent position. Must be experienced in installation & service. Exc earnings for right person. Air- Pride Htg & AC, 7411 N Milwaukee, Niles. 966-7616.

HEATING AND AC
West suburban heating & A/C company seeking experienced installers. Many paid benefits including 401K plan.
Riley Heating, 343-5472

HEATING & AC
SERVICE/SALES
Comm'l, residential. Must be exper. Good pay & excel oppt'y. 749-7993.

HEATNG AND AIR CONDITIONING SERVICE TECHNICIAN

Aggressove HVAC Service Tech to work in Metro Chicago/surburbs. Only qualified Local 597 Techs need apply.
398-7300

HEAVYEQUIPMENTOPERATOR
Refer to Emply Svce 427-1848 Fee $75 Access 1 Job Ref Svc

horticulturalist
★GROUNDSKEEPER★

Full-time opportunity at Ravenswood Hospital. Relevant experience, training and familiarity with horticulture required. Knowledge of small engine repairs a must. Qualified applicants please APPLY IN PERSON. No phone calls, please.

Human Resources Department
Ravenswood Hospital Medical Center
4550 N. Winchester
Chicago, IL 60640
equal opportunity employer m/f

1. In what section of this newspaper do you find jobs listed?

2. What are some other names of sections in newspapers which list jobs?

3. Under what headings (titles) can you find jobs listed for heating and air conditioning?

4. In what order are these headings listed?

5. What information is usually given in the jobs listed?

6. How many jobs related to heating and air conditioning are listed on page 1 of your handout?

7. What do the following mean:

   a. Expd. only w/ refs. apply.

   b. EOE

   c. Exc. pay, benefits, oppty. to advance.

   d. On call duty required.

   e. Refer to Emply. Svce.

   f. Residential & comm. divs. of #1 Service Co. on North Shore.

   g. Salary history.

8. Who do you contact at St. Anne's hospital for the position of Maintenance Mechanic?

9. What kind of place needs a maintenance man in Elmhurst, IL?

10. What are the necessary qualifications for the two HVAC Technicians needed by a Skokie manufacturer? (p.1, Column 3)

DIALOGUE

A: Northwest Heating and Air Conditioning Company.

B: Good morning. This is_____. I'm calling in response to the job advertised in the Lerner for the position of service technician assistant.

A: I'm sorry. We've already filled that position.

B: Are there any other positions that are open?

A: No, there aren't.

B: I would like to send my resume in case there are any future openings. Could you give me the name of the person I should address my letter to?

A: Yes, you should address it to Bob Schmidt, the owner of the company.

B: Excuse me, how do you spell Schmidt?

A: S-C-H-M-I-D-T.

B: Let me repeat that. S-C-H-M-I-D-T.

A: Yes, that's correct.

B: Thank you. And what is the mailing address of the company?

A: P.O. Box 2541, Chicago, IL 60645.

B: Thank you.

A: You're welcome.

B: Good-bye.

A: Good-bye.

Dialogue #2

A: Good morning. ABC Air Conditioning & Heating Company.

B: Good morning. This is_____. I'm calling in response to the job advertisement listed in the Chicago Tribune for the position of air conditioning and heating assistant.

A: Let me transfer you to Mrs. Davidson. She's in charge of personnel.

B: Thank you.

C: Hello. Mrs. Davidson speaking. Can I help you?

B: Yes, this is_____. I'm calling in response to the job advertisement listed in the Chicago Tribune for the position of air conditioning and heating assistant.

C: _____, do you have any experience?

B: Yes, I worked as an air conditioning and heating assistant for one year, and I've had hands-on experience in an intensive 15-week training program at Oakton Community College.

OR

Well, I've had hands-on experience in an intensive 15-week training program at Oakton Community College.

C: All right,_____. Why don't you come in for an interview.

B: O.K.

C: Can you come in tomorrow at 3:00?

B: Sure. 3:00 p.m. That's fine.

C: O.K. See you then. By the way, bring your resume with you.

B: O.K. Thank you, Mrs. Davidson. See you tomorrow at 3:00.

VESL COMPETENCY K1 : Call for info. about job opening, make appointment for interview.

GRAMMATICAL / LANGUAGE FORMS: would/would like, present perfect continuous + for

LANGUAGE SAMPLES:

Trainee:	Hello. This is Fernando Zayas. I'm calling about the service technician's job advertised in Sunday's Chicago Tribune. Is it still open?
Receptionist:	Yes, it is.
Trainee:	I'd like to make an appointment for an interview with Mr. Johnson.
Receptionist:	Mr. Zayas, do you have any experience in this field?
Trainee:	Yes, I do. I've been working as a service technician for the past two years.
Receptionist:	All right, Mr. Zayas. Would tomorrow at 3:00pm be OK?
Trainee:	Yes, 3:00 would be fine. I'll see you then.

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES: Dialogs

Roleplays

Look up jobs advertised in a local newspaper- Know how to read want ads, especially abbreviations.

RESOURCES: Project BEST-Employment Handbook

VESL COMPETENCY K2 : Respond to newspaper ad by writing letter of application.

GRAMMATICAL / LANGUAGE FORMS:

LANGUAGE SAMPLES:

See Sample Letter

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES:

RESOURCES:

Sample Cover Letter

8 spaces
1½"

margin
15 spaces
1½"

margin
15 spaces
1½"

William Hartman
2712 W. Cortland
Chicago, IL 60646
June 22, 1987

3 spaces

(name of person)
Northwest Heating and Air Conditioning Company
7641 N. Milwaukee Avenue
Des Plaines, IL 60016

1 space

To whom it may concern: (OR Dear Mr. last name, Dear Ms. last name)

1 space

I would like to apply for the position of heating and air conditioning service technician's helper as recently advertised in The Chicago Tribune, June 20.

↖ underline the name of the newspaper

I have recently completed a 15-week intensive training program in heating and air conditioning at Oakton Community College. In this program, I had hands-on experience in working on various refrigeration, air conditioning, and gas heating units. In addition, I have worked as a maintenace mechanic for the past two years.* I enjoy doing mechanical work. Because of my training and past work experience, I feel that I am qualified for the position. I am a hard working, responsible, and dependable individual.

1 space between paragraphs.

I would like to meet with you for a personal interview. I can be contacted at the above address or at 643-3718. Thank you for your time and consideration. I look forward to hearing from you soon.

Sincerely,

~4 spaces

William Hartman

~3 spaces

Enclosure

*other possibilites: In addition, I worked as a plumber in my country, Mexico, for eight years.

OR In addition, I studied electronics in my country, Poland, for four years. I also worked as an electronics technician for six years.

___ put your own information in these blanks

VESL COMPETENCY K3 : Fill out job application.

GRAMMATICAL / LANGUAGE FORMS: Adverbial prepositional phrases-location, Idiom-put down, Modal-can

LANGUAGE SAMPLES:

Trainee: Excuse me. In the place where it says "References", can I put down former employees?

Receptionist: Yes, that's fine. You can put down anyone who would know what kind of worker you are.

Trainee: Thank you.

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES: Dialogs

Practice filling out job applications.

RESOURCES: Project BEST-Employment Handbook

MPC PRODUCTS CORPORATION

EMPLOYMENT APPLICATION
CONFIDENTIAL

PERSONAL

NAME _____ DATE _____

ADDRESS _____ CITY _____ STATE _____ ZIP _____

SOCIAL SECURITY NO. _____ TELEPHONE NO. _____

U.S. CITIZEN: ☐ YES ☐ NO IF NO, GIVE ALIEN NO. _____

TO BE ANSWERED ONLY IF HIRED.

MARITAL STATUS _____ NO. OF CHILDREN _____ AGES _____ SPOUSE'S FIRST NAME _____

DATE OF BIRTH _____ SEX: MALE _____ FEMALE _____

POSITION DESIRED _____ REFERRED BY _____

QUALIFICATIONS FOR POSITION _____

_____

EDUCATION

SCHOOL	DATES FROM	DATES TO	NAME OF SCHOOL	CITY	COURSE	DID YOU GRADUATE?
GRAMMAR						
HIGH						
COLLEGE						
OTHER						

MILITARY SERVICE

BRANCH OF SERVICE _____ DATE ENTERED _____ DATE DISCHARGED _____

DUTIES _____

WORK HISTORY LAST JOB FIRST (Use Other Side If More Space Is Needed.)

NAME & LOCATION OF COMPANY	DATES (Mo/Yr) FROM	DATES (Mo/Yr) TO	DUTIES	SALARY START	SALARY FINAL	REASON FOR LEAVING
Supervisor:						
Supervisor:						
Supervisor:						
Supervisor:						
Supervisor:						

I hereby certify that the above is true and correct and any incorrect information will result in not being considered for the position or immediate dismissal if hired. I further give my permission to check the above information as you may require.

_____
Signature of Applicant

FOR OFFICIAL USE ONLY

☐ NOT HIRED ☐ HIRED DEPT _____

JOB TITLE _____ _____ BY

RATE _____ PER _____

REMARKS _____

EEO CLASSIFICATION

_____ _____ _____

Form 6114 Rev. 5

VESL COMPETENCY K4 : Respond to interview questions about job interest, work history, educational background, family, health, transportation, salary, etc.

GRAMMATICAL / LANGUAGE FORMS: What kind of question-present perfect, past tense, present perfect continuous + for/since simple present - pres.DO

LANGUAGE SAMPLES:

Employer:	What kind of work experience have you had?
Trainee:	I worked as an electrician in my country. Since I came here in 1985, I've been working as a maintenance man.
Employer:	Do you have a valid driver's license?
Trainee:	Yes, I do. I've been driving for fifteen years.

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES: Dialogs, Roleplays

RESOURCES: Project BEST-Employment Handbook, Getting a Job and Filling Out Forms- p.22-24

Taken from Getting a Job & Filling Out Forms

3. "Are you willing to work overtime?"	"It depends on which days. I play softball on Tuesdays and Thursdays."	___ ___	_____ _____
4. "Why are you applying for *this job*?"	"Because I need a job."	___ ___	_____ _____
5. "When can you start?"	"Not until next week. I want to get a little more tennis practice in before it gets too hot."	___ ___	_____ _____

Activity 11

Preparing for a job interview

Your ability to communicate well in a job interview is important. Often *how* you say something can decide an interviewer's reaction. Did you say enough to answer questions completely? Did you say too much? Did you say something that will hurt your chances of getting a job? Did your need for better language skills prevent you from saying what you meant? Select the *best* response for each of the questions below.

___ 1. "When can you start work?"
(a) "Anytime next week."
(b) "Will next week be okay with you?"
(c) "Although I prefer Monday, I can start now, if you would like me to."

___ 2. "Can you give me one or two references?"
(a) "One of my teachers, I guess."
(b) "You can talk to the manager at Sun Ray Cleaners or my teachers."
(c) "You can contact Miss Anne Willis, my high school English teacher, and Mr. Lawrence Green, the manager at Sun Ray Cleaners, where I worked last summer."

___ 3. "Why did you leave your last job?"
(a) "I wasn't learning nothing, and I never was going to get ahead."
(b) "I couldn't get along with those people. They didn't show you how to do the job."
(c) "I wanted to find a company that offered opportunities for advancement and training for its *new* employees."

___ 4. "I noticed on your application that you live all the way across town. Will you have any difficulty getting to work?"
(a) "Yeah. That's why I started not to come here."
(b) "Well, this morning I caught a ride with a friend. It really is difficult to get a ride out this far."
(c) "I've already considered that. And I can make arrangements to get to work every day, on time."

____ 5. "On your application you indicate that you have cashier experience. What can you tell me about your experience?"
(a) "Ain't nothing to tell. I just used the register."
(b) "I operated the Accu-Count XL3 register while working at Barclay's Department store as a cashier."
(c) "I worked the register at Barclay's."

____ 6. "We were expecting you at 9:00 and you arrived at 9:30. Did you have any trouble finding us?"
(a) "No, I didn't have any trouble."
(b) "Finding you wasn't the problem. Getting up was the problem. My alarm clock didn't go off."
(c) "I hope my being late has not inconvenienced you. The delay was unavoidable."

____ 7. "Why did you decide to try our company?"
(a) "I don't know . . . I'm just trying everybody."
(b) "In today's tough job market, a person has to try every company with an opening that matches his qualifications and experience."
(c) "I couldn't leave a stone unturned."

____ 8. "Why did you decide to take a job while still in school?"
(a) "There're some things I want to do, and a job will make it a lot easier."
(b) "My mother said find a job . . . so here I am."
(c) "I'm old enough now to work a part-time job after school, and my family could really use the extra income."

Activity 12

Being interviewed for a job

You and a partner may use the situations below to role play job interviewing. One of you act as the interviewer, and the other one act as the applicant. Select at least two situations for practice.

1. You are applying to be a sales clerk at a local department store.
2. You are applying to work in the stock room at a local department store.
3. You are applying to be a counter person in a local burger place.
4. You are applying to be a bus boy in a local restaurant.
5. You are applying to be an office helper at a local business.

VESL COMPETENCY K5 : Ask questions regarding work conditions, employment policies, salary, benefits, etc.

GRAMMATICAL / LANGUAGE FORMS: How much question-pres. Be, What question-Pres. Be, What kind of question-pres. Do

LANGUAGE SAMPLES:

Trainee:	How much is starting salary?
Employer:	$6.75 per hour.
Trainee:	What are the responsibilities/ duties of the job?
Employer:	To start, you'd work on air conditioners and refrigerators in the shop. Later, we'd send you out to customer's homes.
Trainee:	What kind of benefits does your company offer?
Employer:	Paid holidays and 12 sick days. You get two weeks vacation after a year.

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES: Dialogs
Roleplays

RESOURCES: Project BEST-Employment Handbook

VESL COMPETENCY K6 : State desired job and shift preference and starting date.

GRAMMATICAL / LANGUAGE FORMS: What question-present continuous, Modal-could, prefer/would like

LANGUAGE SAMPLES:

Employer:	What job are you applying for?
Trainee:	I'm applying for the service technician's job.

Employer:	When would you be able to start?
Trainee:	I could start next Monday.
Employer:	Do you want the day or night shift?
Trainee:	I prefer the day shift. (would like)

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES:

Dialogs

Roleplays

RESOURCES:

Speaking Up At Work- p.144

VESL COMPETENCY K7 : Request time off or schedule change.

GRAMMATICAL / LANGUAGE FORMS: would like + infinitive, Simple Present, Modal-can, will

LANGUAGE SAMPLES:

Worker: If it's possible, I'd like to work afternoons instead of mornings. I want to take English classes in the morning.
Employer: I think we can work something out.

Worker: Can I leave next Tuesday at 2:00? I have a dentist appointment.
Employer: O.K., but stay an hour later sometime next week to make up the lost time.
Worker: O.K. I will. Thanks.

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES:

RESOURCES: Speaking Up At Work- p.142-144

VESL COMPETENCY K8 : Report absence or tardiness.

GRAMMATICAL / LANGUAGE FORMS:

LANGUAGE SAMPLES:

Worker:	I'm going to be late today. My car won't start and I have to take the bus.
Employer:	Thanks for calling.

Worker:	I'm sorry I missed so much work. My brother was in a serious accident and almost died. I stayed at the hospital with him the whole time.
Employer:	Is he all right now?
Worker:	He's going to make it.
Employer:	I'm glad to hear that. Thanks for calling in.

RELATED LANGUAGE ITEMS:

SUGGESTED ACTIVITIES:

RESOURCES: Speaking Up At Work- p.15-17

Project BEST
Quiz 1 - Cycle 3
Hermann

Name _____

Part I. Complete the following sentences with the words below. Do not use any word more than once.

soft	solidify	fingers	mashed
grip	lower	higher	footing
hard	pressure	knees	soldered
clean	corrosive	legs	plastic
black	same	back	bonding
flows	avoid	different	feet
cleaning	estimate	load	

1. Swaging allows you to connect two tubes of _____diameter.
2. Soldering is a _____ process.
3. The solder must have a _____ melting point than the tubing it is joining.
4. After the molten solder _____ into the pores of the surface of the metals, the solder will _____ and a good connection will be made.
5. A sweat joint is a _____ joint.
6. A good sweat joint begins with _____ the parts to be joined.
7. Flux does not _____ the metal.
8. Flux should have no _____ properties.

Lifting Procedures

9. _____ lifting whenever possible.
10. Before lifting, _____ the load to be lifted.
11. Check your _____.
12. Bend _____, kneel or squat.
13. Use blocking under objects to help get a hand hold and to prevent _____ fingers.
14. Get a good _____.
16. Shift the _____ to turn. Do not twist your body.
15. Let _____ do the lifting.
17. Lower the _____.
18. Keep _____ and toes clear.

Tubing and Pipes

19. _____ ACR tubing is used for residential air conditioning systems.

20. _____ ACR tubing is used for residential plumbing.

21. _____ tubing cannot be used for any kind of fuel.

22. _____ pipe is used for gas lines.

23. Clear plastic tubing cannot withstand high _____.

Part II. Answer the following questions in complete sentences. (2 pts. each)

1. Where are you from originally?

2. Where do you live now?

3. How long have you lived in the United States?

Match the meaning on the right to the word on the left.

1. Withstand	a. melted
2. Assemble	b. available
3. On hand	c. completely
4. Thoroughly	d. harden
5. Excess	f. combination of two or more metals
6. Alloy	g. put together
7. Subjected to	h. extra
8. Molten	i. exposed to
9. Solidify	j. join
10. Bond	

Project BEST
Quiz - Week 3

Name _____

A. Fill in the blanks with the correct words from the list below. (15 pts.)

electrical equipment	flammable liquids, grease	fire extinguisher
electric shock	conspicuous	time
rechargeable	money	inspected
accessible	ordinary combustibles	dangerous
dry chemical	fire blanket	liability

1. Two important pieces of safety equipment for every shop are a _____ and a _____.
2. A fire extinguisher must be _____ regularly and be fully charged.
3. Fire extinguishers are _____.
4. Fire extinguishers and fire alarms should be in _____ and _____ places.
5. Class A fires are fires of _____.
6. Class B fires are fires of _____.
7. Class C fires are fires of _____.
8. An ABC type fire extinguisher is a multi-purpose _____ type of fire extinguisher.
9. Using the wrong type of extinguisher for the class of fire may be _____.
10. Failure to provide for safety may result in pain, _____, and loss of _____ and _____.
11. Crepe-soled shoes help prevent fatigue and _____.

B. Fill in the blanks to describe the proper procedure for lifting. (10 pts.

1. _____ the load to be lifted.
2. Check your _____.
3. Bend _____, kneel or squat.
4. Use blocking under objects to help get a hand hold and to _____ mashed fingers.
5. Get a good _____.
6. Let _____ do the lifting.
7. Shift the _____ to turn.
8. Lower the _____,
9. Keep _____ and _____ clear.

C. Answer the following questions about swaging and making a swaged connection. (10 pts.)

1. In what do you secure the piece of tubing?

2. What type of swaging tool do you use to enlarge the opening of the tubing?

3. Why should you tap the swaging tool gently?

4. Do you apply flux to the larger tube or the smaller tube?

5. Why do you rotate the two pieces of tubing after fitting them together?

D. Answer the following questions with a <u>short</u> answer and then a <u>long</u> answer. (15 pts.)

1. Have you ever considered going back to your native country?

2. Has your weight changed since you came to the United States?

3. Have you received any letters from friends or family recently?

4. Have we studied the chapters in our book on heating yet?

5. Have you already completed this course?

Project BEST
Quiz 5
Hermann

Name _____

Part I

1. Tell me two things you have to do regularly, i.e. every day, every week, or every month. (2 pts.)

   a. _____

   b. _____

2. What must you do today or tonight? (use "must" in your answer - 1 pt.)

   _____

3. Explain how to get from this room (the lab) to David's office. (4 pts.)

   _____

   _____

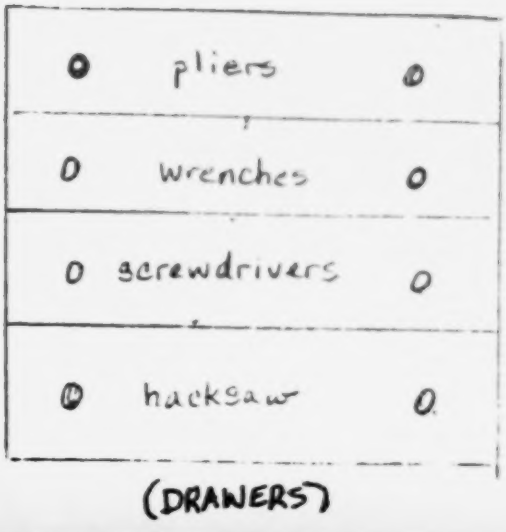
   _____

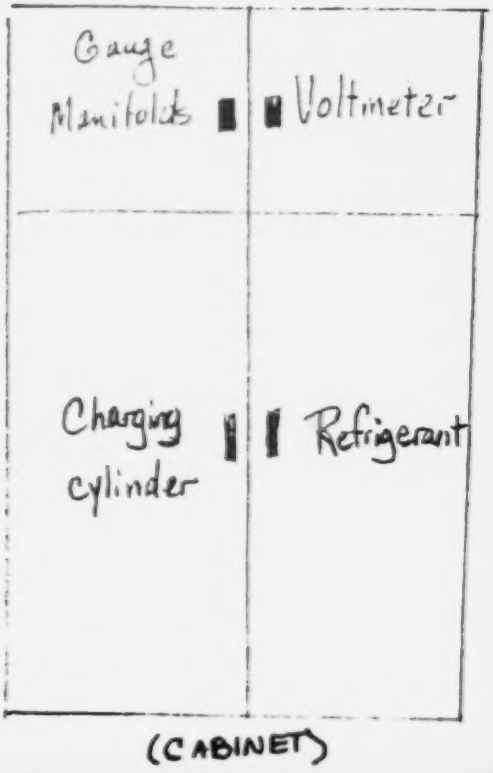
4. You want to go to the cafeteria. How would you ask for directions to the cafeteria? (5 pts.)

   Excuse me. Could _____?

   _____ me. How _____?

5. Look at the picture and tell where each of the items are located. Write your answers in complete sentences. (Note: Some forms are singular and some are plural.)





a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

g. _____

h. _____

6. What do the following words or abbreviations mean? (5 pts.)

   a. lbs. = _____

   b. an increment = _____

   c. to restrict = _____

   d. It is advisable. = _____

   e. e.g. = _____

Part II

Directions: Use the appropriate verb tense (Simple Present, Simple Past, Present Continuous, Past Continuous, Present Perfect, or Present Perfect Continuous) in the sentences below. Write your answer on the line provided before each sentence.

_____ 1. Mom (bake) bread in the kitchen now.

_____ 2. We (see) them off and on.

_____ 3. Carla (babysit), wasn't she?

_____ 4. I (help) her move yesterday.

_____ 5. I (know) my rommate for two years.

_____ 6. The sun (shine) when I left this morning.

_____ 7. He (travel) in Europe since last June.

_____ 8. I (study) English for a very long time.

_____ 9. She (sew) dolls as a hobby.

_____ 10. Right now, I (write) as fast as I can.

_____ 11. Mr. Wilson (live) here for twenty-five years.

_____ 12. While I was studying, she (sleep).

_____ 13. Since Carol broke her leg, she (be) unable to get around much.

_____ 14. Tom (understand) what you're saying.

_____ 15. He (leave) tomorrow for New York.

_____ 16. We (advise) him to stay ever since he came back.

_____ 17. I (finish) my homework already.

_____ 18. Sue was washing her hair when the phone (ring).

_____ 19. The man (drop) the bowling ball on his foot.

_____ 20. It (begin) to rain.

Quiz 9
Project BEST - Cycle 3
Hermann

Name _____

Part I. Verb Tenses

Complete the following dialog with the correct form of the verbs given.

B: George, _____(be) that you? I _____(can-negative) believe it. It _____(be) almost five years since I last _____(see) you.

G: Wow! Bill! How _____(do) you _____? You are right. It _____(be) a long time.

B: So, George, tell me. What _____(do) you _____ the last five years? _____ you _____(work) now?

G: Yes. I _____(get) a job at a heating and air conditioning place in Chicago right after I _____(finish) the course at Oakton. At first, I _____(be) just a helper, but now they _____(send) me out on my own to do service calls. How about yourself?

B: Well, I _____(get) a maintenance job in Des Plaines. It _____(be) great! The things I _____(learn) at Oakton _____(be) very helpful on the job.

G: Listen, Bill. I _____(need) to go, but it was great to see you.

B: Same here, George. Take care.

G: You, too. See you.

B: Bye.

Part II. Understanding Procedure Changes

Fill in the blanks of the following dialog with an appropriate word or words.
S= Supervisor
W= Worker

S: John, _____ you finished yet?
W: No, _____.
S: How long _____ it _____?
W: _____ five more minutes.
S: O.K. When you finish what you _____, I want you to work on this refrigerator.
W: What _____ the problem?
S: The refrigerator section is too warm. Check the seal, airflow control, and freezer fan.
W: You _____ me to check the seal and airflow control. And what was _____ _____?
S: The freezer fan. When you _____ checking those things, report back to _____.
W: O.K. I _____.

Project BEST
Quiz - Week 11
Hermann

I. Fill in the blanks with an appropriate word from the list below.

steel	cast iron	air
convection	multi-strand	explosion proof
semi-circular	water	explosion resistant
insulator	linear	solid-circular
orifices	copper	brass
triangular	slotted	honeycomb
gas distribution orifice		blue
primary air adjustment		yellow

1. There are two kinds of condensors: _____ cooled and _____ cooled.
2. Dust works as an _____; it does not transfer heat.
3. When heat is transferred due to the movement of warm and cool air, we call this _____ _____ type heat flow.
4. If a piece of equipment can resist an outside explosion (in the environment), we would say that this equipment is _____ _____.
5. If a piece of equipment will not cause an explosion, we say it is _____.
6. The wire that we use for thermostat wiring is _____.
7. The three shapes of burners are: _____, _____, and _____.
8. The three materials burners may be made of are: _____, _____, and _____.
9. The three types of burners are: _____, _____, and _____.
10. The part of the burner that shoots the gas into the burner is called the _____.
11. Another name for the combustion air flow controller is the _____.
12. If the burner is using natural gas and there is not enough air, the flame color will be _____.

II. Vocabulary : Match the meanings with the words. Put the letter of the meaning in front of the word it belongs to.

_____	1. Thus	a. for a long time
_____	2. Furthermore	b. to be responsible for the problem
_____	3. to surge	c. to approximately decide
_____	4. to remedy	d. can't go or start
_____	5. to be at fault	e. in addition
_____	6. for a considerable amount of time	f. to place together
_____	7. to roughly determine	g. examine and replace all needed parts
_____	8. to be idle	h. to increase suddenly
_____	9. to be stuck	i. as a result
_____	10. overhaul procedure	j. to be in disuse for a while
_____	11. to lap	k. to make right (rectify)

III. Verbs : Fill in the blanks with a correct form of the verb.

I usually _____ (take) the bus to school. It _____ (take) me a long time, almost two hours. But today I _____ (get) a ride to school. I was so happy. On the way, however, we _____ (have) some problems. First of all, it _____ (start) to rain and the windshield wipers _____ (work - negative) properly. Then someone _____ (hit) us from behind because it _____ (be) so slippery. Fortunately, no one _____ (be) hurt. Finally, we _____ (arrive) at school. Maybe taking the bus isn't so bad afterall!

* * * *

I _____ (attend) school at Oakton since April. At times it _____ (be) frustrating and difficult, but overall it _____ (be) good. I _____ (learn) a lot about refrigeration and air conditioning systems. Now we _____ (learn) about heating systems. I think my English _____ (improve) alos. I _____ (hope) that I _____ (find) a good job after I complete the program.

Final Exam
Project BEST
Hermann

Name _____
Date _____

Part I. Answer the following questions in sentences. (2 pts. each)

1. What protective clothing should you wear when working with dangerous chemicals?

_____

2. What protective equipment should you wear when there is a danger of flying particles in your eyes?

_____

3. What should you wear when there is a danger of falling objects on the feet?

_____

4. A worker received an electrical shock while doing some wiring. What should he have done?

_____

5. A man hurt his back while lifting a heavy load. What should he have done?

_____

6. Have you completed this test yet? _____

7. What do you have to do by the end of the weekend?

_____

8. Fill in the blank. In teamwork (two people working together), one person helps _____.

9. What would you say if you wanted to remind your friend to call you next week?

_____

10. What are you going to do after you complete this course?

_____

11. What would you say if you wanted to borrow my pencil?

_____

12. What would you say in a job interview if you were asked:
Why do you think you'd be good on the job? _____

_____

_____

_____

13. Do you like to work with others or by yourself? _____

_____

_____

Name _____

Part II. Fill in the blanks with the correct words from the list below. (19 pts

electrical equipment pilot flammable liquids
volts punch ear muffs gas manifold fuel
convection conduction millivolts estimate
burners heat exchanger high energy rechargeable
respiratory equipment plug carelessness lifting
drafthood floating solenoid

1. Class B fires are fires of _____.
2. Fire extinguishers are _____.
3. _____protect the hearing of machine operators.
4. _____ is used when there are harmful dusts, fumes, or gases in the air.
5. Before you lift any load, it is important to _____ the load to be lifted to be sure you're able to lift it.
6. Most accidents are caused by _____.
7. A _____ type swaging tool is used to enlarge the opening of a piece of tubing.
8. The circulation of a gas or liquid because of a difference in temperature and density is called _____.
9. Immediately after removing a part from a refrigeration system, you should _____ all refrigerant openings.
10. The _____ is the pipe that distributes gas to the burners.
11. A _____valve is an electromagnet with a movable core or center.
12. The _____ is located between the heat exchanger and venting system.
13. The limit switch prevents the _____ from overheating.
14. A non-100% shut-off valve shuts off gas only to the _____, not to the _____.
15. The electrical energy produced in a thermocouple is measured in _____.
16. A _____ pilot flame will result if there is too much gas pressure.
17. A blocked flue may cause a _____ pilot flame.
18. Propane, Butane, and Natural gas are called _____gases.

Name _____

Part IIL Match the definitions with the words. (13 pts.)

____ 1. accessible	a. a good idea
____ 2. burden	b. acceptable
____ 3. thorough	c. stay clear of
____ 4. It is advisable.	d. bad
____ 5. to furnish	e. complete; careful with detail
____ 6. liability	f. heavy load
____ 7. unobjectionable	g. not enough of
____ 8. assertive	h. duty, responsibility
____ 9. task	i. direct; not shy
____10. avoid	j. easy to get to
____11. rule of thumb	k. financial obligation
____12. faulty	l. bad
____13. lack of	m. to provide, supply

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PROJECT **BEST**

Building Energy Systems Technology
-Heating/Air Conditioning-
For Students of English as a Second Language

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Project BEST Update
July, 1987

In late June Project BEST received the unfortunate news that the program had not been selected for refunding by the federal funding source, the Office of Bilingual Vocational Education, U.S.D.E. Due to federal cutbacks in the budget, only about one-third of the 19 bilingual vocational training programs funded for the 1986-1987 18-month grant period could be refunded for the upcoming 1987-1988 grant period.

It is hoped that at least some components of this "BVT" program can be either institutionalized or continued in some form independent of federal dollars.

ERIC Clearinghouse for
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